Journal of the American Foundrymen's Association.

VOL. X. JUNE, 1901. PART II.

PROCEEDINGS OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION, IN CONVENTION AT BUFFALO, N. Y., JUNE 4, 5 AND 6, 1901.

Through the courtesy of the foundrymen of Buffalo, our Association held its sixth convention in the Exposition city of the year. The headquarters were established at the Niagara Hotel, while the sessions took place in the assembly room of the magnificant new 74th Regiment Armory.

President W. A. Jones opened the proceedings at 10:30 A. M. of the 4th of June, by introducing the president of the Buffalo Merchant Exchange, Mr. O. P. Letchworth, who represented the mayor of the city as well as Buffalo's industries and business interests. Mr. Letchworth is a member of our Association and is widely known and well beloved by the foundrymen of this country. He spoke as follows:

ADDRESS OF MR. O. P. LETCHWORTH.

Mr. President, Ladies and Gentlemen, Members of the American Foundrymen's Association:

It is with a great deal of regret that I have to announce this morning that his Honor, the Mayor of the City of Buffalo, is unable to be here with us. He had hoped to have done himself that pleasure but an important engagement made it impossible. He desires me to present his compliments to you, and in his behalf to extend to you the cordiality of the municipality of the City of Buffalo, together with the wish that your stay here may prove in every way profitiable, pleasant and with the result of much good not only to Buffalo but to you individually. I also desire, in behalf of the Buffalo Merchants' Exchange, which represents the commercial life of Buffalo, to supplement the good wishes of his Honor, the Mayor, and to say to you how deeply we appreciate the honor and the compliment conferred upon

the City of Buffalo by having so distinguished a body of gentlemen and their associates, the ladies, with us upon this occasion.

Of course, the commercial life of a city is somewhat different from its municipal life. We recognize that in the commercial life of a city those associated in its business interests appreciate possibly more keenly than those in the other walks of life the vast importance and the great good to be accomplished in any community by those who are known as its active workers. It is possibly a little egotistical for me, representing a line of industry in which you are similarly interested, to say I honestly believe that the commercial life and success of any large municipality depends largely upon its manufacturing industries.

I say this with no reflection derogatory at all to the other important interests of the city, to its professional life, its mercantile life, its banking institutions, but I believe it s a well recognized and established fact and so considered and understood by all that in order to make a city successful and prosperous, the sinews that will bring about such successful results are those that emanate from the manufacturing industries. They are the ones that collect and bring into any community the finances; they are the ones that distribute these in the small sums paid to the employees and to the other sources of their disbursements. They may be considered, so to speak, as the clearing house for the laborer, through which channel he finds a market for his product, and so through a thousand little rivulets they distribute, throughout the length and breadth of any large city, those important elements which are essential to success, to its financial growth; the funds which they are able to gather from outside sources.

And so these business men of Buffalo deeply appreciate, I say, the importance of having, in our midst to-day, so representative a body of so important an industry in our country's welfare, and I repeat, in behalf of the Buffalo Merchants' Exchange and the Buffalo Board of Trade, that we extend to you our most hearty greetings, together with a wish and the earnest hope that your deliberations may be of such a character, as I have no doubt they will, that they may bring forth most beneficial results to you individually and indirectly to the country at large.

It is greatly to be deplored that at this particular time the

relations between capital and labor, in many lines of trade, are somewhat strained. I have great faith, however, that the future has better things in store for us. I have great confidence in the belief that the more intelligent, conservative representatives of labor appreciate the gravity of the situation and that they are anxious and desirous to take such steps that may possibly prevent more strained and more difficult relations than now exist.

We all realize as they must that but one result must inevitably follow from such strained relations, namely, the strangulation and the ultimate destruction of the country's best interests. I also have great faith and great confidence in the forbearance, the intelligence, the charitv, the good sense and the level-headedness of the business men of this country. I believe that they, at heart, are anxious and are determined to take such steps in a fair, liberal, sensible way as to be able to bring together more closely and in the relation that properly should exist, the employer and the employed, those who must inevitably be closely allied to bring about the most satisfactory results to all interests.

I also wish to say in behalf of the citizens of Buffalo at large that we feel deeply indebted to you for bringing to us the beautiful sunshine. It has been a rare experience. For thirty days we have looked upon glowering skies and have been afflicted with heavy, damp, wet weather. We knew that there must be some cause of it; we did not feel at liberty to attribute it to our Pan-American Exposition, although the officials of that institution have felt that it might be the cause. But now we realize fully that the skies have been holding back their sunshine in order to give a cordial welcome, as do the citizens of Buffalo, to the American Foundrymen's Association.

The President: It affords me pleasure, gentlemen, to introduce to you Mr. Bell, who will respond to the welcome of Mr. Letchworth.

RESPONSE OF MR. C. S. BELL.

Mr. President, Gentlemen and Ladies:

It is rather an embarrassing position to be in, for the President to announce that he introduces me, for the purpose of responding, only just this moment. However, I may readily say

in behalf of the foundrymen present that they extend their warmest appreciation of the kind words that have been said to us by Mr. Letchworth. We fully appreciate his kindness and the kindness of the people of Buffalo. We meet together more for our own pleasure and sociability than to contend with the great problems which connect the manufacturer with the laborer. We wish to renew our acquaintances, one with another; we wish to become acquainted with our competitors; we wish to find the better side of our competitors in order that we may have less of that antagonistic temperament that has been so common throughout the land. We appreciate the kindness of the local committees here that have provided for our entertainment. We do not know how we could fully express our good feelings in that respect, but we beg to say to you that we fully appreciate it and will do our best to make our stay with you as pleasant as possible for everybody, knowing full well your kindness and your disposition to entertain us. We have come to Buffalo under very favorable circumstances. Whether we are the cause of it or not we will credit it all to the municipality and to the Board of Trade of Buffalo, for having organized and brought forth such beautiful weather for our entertainment, for our enjoyment, and for which we are very thankful.

The President: It now becomes my duty to deliver to you a report of the condition of the Association's interests for the past year.

REPORT OF THE PRESIDENT.

Fellow Members of the American Foundrymens Association:

With the opening of this, the Sixth Convention of our Association, another year of its history has been brought to a close. A year which to the most of us has been a fairly prosperous one, a year which until within the past few weeks has not been marked with the upheavel of labor troubles which seem so difficult to avert during years characterized as periods of prosperity.

The abnormal conditions of trade experienced last year, which brought such serious clashes between employer and employee on the wage question, had, we had hoped, settled down

to a more normal condition, and that its outlook has assumed more encouraging features. From every quarter of the land came the cheering intelligence: our business is very satisfactory. While not experiencing anything of a boom, the improvement in trade is steady, and of a healthy tone, and if we can only steer clear of labor troubles, the year will be one of marked prosperity.

These conditions are not merely of a local nature, but are heralded from almost every quarter, and in no one point is it more apparent than right here in your beautiful City of Buffalo, the City famed for Conventions, the City upon which the eyes of all America have been centered since the Pan-American Exposition became a fact, and whose buildings in beauty of architectural design are rivaled only by those of the Great White City of the World's Fair, at Chicago.

Our Association is no longer an experiment, it is an educational institution whose influence is felt not only in this country, but its papers are eagerly sought for, and read by our brothers across the water. Its journal is to-day just what the busy Foundrymen has wanted for years, a practical "Review of Reviews" of the current Foundry literature of the country, the extract of that portion of our trade journals touching foundry interests, brought together in such shape that it commends itself to all. It is an institution which I regret very much to state, does not receive that hearty support to which it is so justly entitled, but this I am lead to believe is because its value is yet unknown to the most of us, a fault which will soon be remedied I trust.

It is not my purpose at this time to take up your valuable time with a lengthy report of what has been accomplished in our modern foundries where electricity and compressed air have been harnessed to achieve results that had hardly been dreamed of; of the strides made in modern foundry practice through the introduction of chemistry; nor of the internal workings of our Association. Of these you will learn from the report of our secretary, and the able papers to be read and discussed during our convention, but gentlemen! There is one thing that I do want to call your attention to, and trust that you will give it your serious consideration. I refer to the great good which has been accomplished by the National Founders' Association, and

its sister organization, that of the National Metal Workers' Association. I do not propose to go into details, as to the merits of these organizations, but I do not hesitate to make the broad statement that those of you who are conducting a manufacturing business, will learn, and that, too, in the very near future, that you cannot well get along without them, and the influence they exert. These organizations are not aggressive, but progressive, they are the great medium by which we are brought in direct touch with the better element of organized labor.

Labor organizations can only be successfully dealt with by the organized interest of the employer, and the two Associations referred to are recognized, not as an enemy in camp, but an avenue to the amicable settlement of the difficulties that are bound to arise, and that, too, without the instroduction of that relic barbarism, the strike and the lockout. As an evidence of this I have only to cite to you the experience of the Stove Founders' Defense Association, who have not had a single strike for a period of more than ten years.

I cannot close this report without calling your attention to the manner in which our secretary has so ably handled the duties of his office. It is only those who are in close touch with him that can realize even in part, what this implies, and I do not hesitate one moment in stating that to his untiring efforts more than all else combined, is due the splendid footing on which our organization now stands. This has been accomplished only by giving, not hours, nor days, but weeks of his valuable time, and in many instances at a sacrifice of his personal interest and comfort, and, I am afraid, too, his health as well.

In closing my address, I wish to thank every member of the Association for the hearty support they have given your officers, and to wish you all unbounded prosperity for all time.

The Secretary, Dr. Richard Moldenke, then read his report, occasionally interpolating matter which detailed more fully the points brought out.

REPORT OF THE SECRETARY.

In making this first report to our Association your Secretary desires first to briefly review those internal matters which

so vitally affect our organic life. Established five years ago on the general belief that it would be a good thing for foundrymen to get together, the Association came to life in a period when methods began to change partly through the exigencies of the hardest times this country has ever passed through, and then again by reason of rapid developments to be credited to our investigators. The result was a plenty of foundry practice to be discussed by those who were anxious to keep in the front ranks as producers, and conventions, the main features of which were drifting to the incidental entertainment. Gradually, however, matters of daily practice were fairly well discussed, and the achievements of the "industrial engineer" in lines other than ours beginning to be felt most uncomfortably by those of us who supply the enormous tonnage he consumes, attention was perforce turned to the subject of rapid production of castings at selling prices far below anything we had ever known. From then on the questions of standardization so ably foreseen and provided for in our constitution were taken up and thus a purpose given our deliberations which promised to be of most far reaching consequence. Our members will no longer scan the programs so much for the charming courtesies of our generous hosts, but will look for the sober business which may mean so much in their future commercial relations. As a remarkable corroboration of these statements it may be added that correspondence with practically all writers on foundry topics has developed the fact that our most practical foundry managers are studying foundry science deeply and make daily application of it in their own works. Throughout the year it has been the aim of your Secretary to obtain papers relating to points of practice in the foundry, but the results show that either the subject is already too well threshed out, or that the newer foundry methods are monopolizing almost everybody's attention. In any case our members were not the losers, and the range of foundry thought was pretty evenly, covered as may be seen in our publications.

At the close of the last fiscal year it was recognized that radical measures were necessary to prevent the anticipation of collections in carrying out the work of this Association in the future. First, the members in arrears several years were communicated with, as well as those who had never even paid any

dues at all. Where repeated letters would not bring a response the "Journal" was first stopped, and the member finally dropped. This very necessary action meant the removal of 26 names from the list. Quite a number of resignations must also be chronicled, the reasons given varying from none to the plea that the funds were needed for other Associations. Then again consolidations of foundries have left their effect. The total loss in membership amounted to 59. We can, however, chronicle the addition of 41 new names, some of which came to us through the generous action of the Pittsburg Foundymen's Association in amending their constitution so as to include a membership in our Association in the annual dues. The full effect of this change will be felt during the coming fiscal year. The present total membership is 297. Attempts were also made to induce the other local foundrymen's associations to follow the example of the Pittsburg Association, but resulted in failure. We have furthermore to thank the Pittsburgh Foundrymen's Association for their generous appropriation of nearly $80.00 to pay for the printing and distribution of some 3,000 pamphlet parts of our journal to 1,000 foundrymen of this country in order to bring our work before them. This was later on supplemented by the distribution of a further nearly equal amount of literature, together with 1,000 invitations to our convention. Thus the American Foundrymen's Association has been well put before the public, and from the number of inquiries and letters of acknowledgement received, much good should result therefrom.

At the time of the last financial report there was a balance of $233.24 in the treasury, with $562.14 owing for printing and postage, and $750.00 due the Association from its members. Of this $320.00 could not be collected, so that the real balance would have been $101.10, with collections averaging six months in advance. The acounts at the beginning of this coming fiscal year are as follows:

Disbursements for "Journal" $1,224 86
(Of which $458.95 is chargeable to old accounts paid off, and $81.73 for the coming year.)

Postage 194 19
(Of which $3.18 is for old account.)

Printing	135 25
Sundry expenses	68 03
Traveling expenses—None charged.	
Salaries	587 66
(With $600.00 still owing.).	

There are no other bills outstanding.

The income was as follows:

Balance in treasury	$ 34 48
Dues collected during year	1,854 00
From standardizing bureau	376 30
Other income from sales, etc	13 52
Total	$2,278 30

To this is to be added the uncollected dues for June and the outstanding dues for the year, a safe estimate of which is $780.00. The cash balance in the treasury is $68.31.

The condition of our finances is therefore not alarming, but is not sound, as the income is represented by collections averaging six months ahead, and the disbursements are on account of requisitions which have been filled. What is required is a regulation of the dues so that they may be collected at one or two times during the year at most. In this way the expenses can be made commensurate with the income and a better apportionment for the various accounts agreed upon. Only when the funds for the disbursement of the year are available near its beginning will the Association be safe financially. A sudden cessation of business would otherwise find members with dues advanced and no return therefor in sight. As it will not be policy to raise the dues of this Association, only an increased membership will bring about the desired end.

The form of the "Journal" was changed radically at the beginning of the fiscal year just completed, and the pamphlet form, which has been found so satisfactory by our great technical bodies, adopted. Our funds being limited, the idea of furnishing an annual volume in which papers, discussions, etc., could be nicely arranged and indexed, could naturally not be entertained. However, by sub-dividing into parts, paging each part continuously, an arrangement was brought about which permitted an

easy method of indexing and will, it is hoped, form a substantial volume of foundry progress for the past year. The subscription list of the Journal has been increased, and many extra copies were called for by our members and friends.

Your Secretary has found the criticism and suggestions of many of our members very valuable, and begs for further expressions touching upon the publication of our journal which, as you know, is intended to be a compendium of contemporary foundry literature, much upon the plan of the Journal of the Iron and Steel Institute of Great Britain. Especial care was taken to get the papers read throughout the year in the hands of our members at least as soon as they could be published by the technical press, which by the way, was well cared for and valued by our Association. The proceedings of the local associations were taken from the journals which were represented at the meetings, the secretaries not furnishing us with copies of the minutes in question. Proper credit was always given therefor.

Your Secretary must further express his sincere pleasure at the reception accorded his reviews of foundry articles appearing in the technical press of the world. These entailed an immense amount of labor, and embraced many subjects heretofore untouched, but nevertheless of interest to our foundrymen. The best evidence of their value seemed to be in the constant receipt of requests for reviews of specified articles, which the respective writers desired others to get the benefit of also. If the funds of our Association would only allow it these reviews would be extended considerably, with the consequent enhancement of the journal to our members.

In connection with the "Journal" question it may interest our members to know something of the amount of work entailed by the rather vigorous presentation of our interests before the industrial world. Early in the year it became necessary to retain a post office box to accommodate the many exchanges and letters which arrived daily. Your Secretary wrote 1,799 letters, dispatched 3,714 circulars and 8,241 pamphlets, or in all, 13,754 pieces of mail, and in this feels quite certain that there are not many members of the iron industry of the world who are not aware of the aims and objects of this Association, inasmuch as the correspondence extended to England, Germany, France, Italy, Finland and New South Wales. It rests with us now to

build upon this and develop a financial strength which will still further increase the usefulness of our Association to the trade at large.

In accordance with the resolution concerning the better training of our future foundry managers, passed at the last convention, your Secretary begs to report that this matter was taken up by correspondence with practically all our institutions of learning which devoted some attention to technical education. With only one exception replies were received, and these indicated the serious thought given to the problem. Indeed the establishment of a department for foundry theory and practice has been strongly recommended in the case of the "Carnegie Technical School." A very extended series of letters was the result, for many of our universities wished to know in what way they could aid our industry. The consensus of opinion seems to be that pending special equipment for the purpose instruction should be given in foundry practice by lecture and regular visits to the more advanced foundries of the respective districts. Summer classes should be formed for the students who wish to make this their life work, or they should become volunteers in order to learn what they can of the practical operations of foundry procedure. Once the foundry becomes the desirable field for technical students it should, and the institutions for learning are enabled to add foundry apparatus to their equipment, plenty of use will be found for it, not only for teaching the various branches of the industry, but for advanced investigation, and consequent benefit to the students as well as ourselves. We sincerely hope this agitation in teaching circles may go on, and feel that as our requirements become better known thereby the solutions will suggest themselves in the natural course of events.

The relation of our Association with the local bodies of foundrymen has been most pleasant. Papers have been furnished to the Pittsburg, Philadelphia, New England, Milwaukee and St. Paul and Minneapolis Foundrymen's Associations regularly, and it is to be hoped that our Association may eventually reap some benefit by way of increased membership therefrom, in return for the effort and expense entailed in the collection and distribution of nine papers in editions of 250 copies each, in addition to the regular work of the Association throughout the year.

In obedience to a request for information relative to the melting loss in the cupola process, your Secretary distributed suitable blank sheets of inquiry and is still receiving returns. The amount of interest created is most gratifying, replies having come even from Europe, and those of our foundrymen who may still wish to help obtain this information of such importance to the trade are requested to communicate with the Secretary. It is hoped that a synopsis and study of these memoranda can be presented early in the fall.

From the numerous requests for specifications for gray iron castings received during the year, from the operating departments of great industrial corporations, the action which will be taken on the report of our committee on standardizing the testing of cast iron will be observed with much interest. Indeed, the magnitude of our industry is such that the wish has been repeatedly expressed that our Association should take up this question seriously with the International Association for testing materials at the coming convention in Buda-Pesth, acting through the American Section, of which we are members.

It is with deep regret that your Secretary must chronicle the death of two of our members during the past year. Mr. W. H. Carpenter, of Providence, R. I., and Mr. Sylvester N. Leary, of Brooklyn, N. Y., both gentlemen being prominent in their respective communities. Our sympathy goes out to their bereaved families in fullest measure and we pray the Almighty to heal the wounds in His good time. Further, a few weeks ago, your Secretary received one of his letters to our friend, Capt. Henning, of Berlin, returned unopened with the notice "deceased" written upon it. The foundry trade of Germany loses its most ardent advocate of progress, and many of our American foundrymen a very warm friend.

There is little more to be said. On reflecting upon the events of the past year one is forcibly brought face to face with the fact that an association of men having heavy interests in a given line of production to maintain against the keenest of competition in the world's markets, should find itself in position to be of the greatest possible benefit to its members and the trade at large. The sum and substance of this is really to furnish information which will cheapen the production of castings by the method of making them. The work done by our indi-

vidual experimenters should be carried out under the auspices of this Association. Reports should be made from time to time on the actual condition and the workings of improvements which are of general interest. To do this properly requires a staff so organized that the value of the work done is commensurate with the expense entailed. This in turn is based upon a large membership and financial support which would enable good men to devote their entire time to the respective work they may be selected for. Even now we are in receipt of a courteous invitation to place some of our advanced studies more especially on the electrical properties of gray iron and steel castings in the care of Purdue University, which is doing such splendid work for the railroad, electric light, and telephone interests. It is to be hoped that our Association may soon be able to avail itself of this opportunity.

The Association may never arrive at the desired stage of development as outlined above, but the necessity for it in a growing industrial country is pointed out herewith, and the hope expressed that some measure at least may eventually be realized.

Respectfully submitted,

RICHARD MOLDENKE,
Secretary.

The President: I think, ladies and gentlemen, that the few remarks I made relative to the work of the secretary not being fully understood, will be better appreciated now. I think you can gather, from some few lines that he has read, the nature and extent of his work, the writing of his reviews on Pullman cars, on ferry boats, and all that kind of thing, shows this up very plainly.

The Secretary: Well, it was done with the greatest good heart. I enjoy this work more than any other.

The President: The next in order, I believe, is the report of the Treasurer.

Treasurer Howard Evans: The Treasurer has made his report through the Secretary.

The Secretary: The items were all given in my report so that the matter would seem to be covered fully, I think.

The President: The next on the program, gentlemen, is the report of the Committee on the Constitution, Mr. Willis Brown being chairman.

Mr. Brown:—*Mr. President and Gentlemen:*

A year ago an endeavor was made to amend the constitution and by-laws in one or two particulars, and it developed the fact that it needed more amendment than the time available would allow them. It was therefore placed in the hands of a committee, consisting of your President, Mr. Bell, Dr. Moldenke, Mr. Keep and myself, and I have the honor to submit the result of their labor.

CIRCULAR LETTER TO THE MEMBERS OF THE A. F. A.

Buffalo, N. Y., June 4, 1901.

The American Foundrymen's Association:

Gentlemen:—

Your committee to whom was referred the revision of the constitution and by-laws, beg leave to report as follows:

They found the existing form rather vague from the fact that it begins as a constitution, and after running through eight sections of several articles each, provides that these by-laws may be amended, thus beginning as a constitution and ending as a by-law.

Your committee has divided this matter into two parts, one distinctively a constitution which follows closely such portions of the existing form as are properly classified in the constitution. Everything else is introduced under the heading by-laws, and only such changes are recommended as are deemed necessary to carry out the purposes of our organization successfully and speedily.

Two changes are suggested in the constitution, the one which gives the Association the original authority to decide the time and place for the following annual meeting, and provides for another method in case this matter is not decided at the annual meeting. Then while it is quite a common thing for ordinary associations to hedge about the constitution and by-laws with restrictions as to amendments, which makes it difficult to amend without a considerable amount of red tape; it seems to the committee that when an association meets but once a year it should have the authority, as it undoubtedly has the right to change its constitution and by-laws at will, subject only to the re-

quirements that a majority of the association desire such change.

Passing to the by-laws, few changes are suggested except in detail. The committee believe that it would be wiser not to have any change in the presiding officer during the annual meeting, and that he who has had charge of the business of the association during the year should be permitted to preside until the close of the annual meeting, and then turn over to his successor in office the affairs of the Association unbroken in period. Furthermore, deferring the election until just prior to the adjournment will have a tendency to hold all the members until all business is transacted. All of which is respectfully submitted.

Willis Brown,
W. A. Jones,
C. S. Bell,
W. J. Keep,
Richard Moldenke,
Committee.

Note: The constitution as adopted finally will be found further on.

The President: Gentlemen, you have heard the report of the Committee on the Constitution. What is your pleasure in regard to it? Will you take it up item by item and pass upon it or is it your wish to pass upon the whole matter collectively? I would be pleased to hear an expression of the members in regard to this matter.

Mr. Yagle: Mr. President, inasmuch as the committee has spent considerable time in revising the constitution, I move it be adopted as a whole.

Mr. Zimmers: I second the motion.

Mr. Wiard: I would like to call attention to Sec. 13 on amendments: "These by-laws may be amended at any regular meeting of the Association by a two-thirds of those present, provided the affirmative vote represent a majority of the members of the Association." Now, there may be times that it would be difficult to get a majority of the members present, so that in such an event they could not pass any amendment, for it requires a pretty large majority. It would be doubtful whether enough members would be present at any time. After the Association has grown a little more it is not to be expected that

half of the members will be present. They may have to come a long distance and it is doubtful whether there would be a majority of the whole membership present in a great many cases.

The President: I think the point is well taken. We have not a majority of the members here. It might be well, however, with the exception of that item to adopt it as a whole and then take that matter up for further revision.

The Secretary: Mr. President, would it not be best to simply strike out that part?

Mr. Brown: Mr. President, as a general proposition possibly that objection is valid, but I doubt the wisdom of placing the amendement to our constitution and by-laws under the control of a number less than a majority of our membership. Any constitutional amendment or amendment of the by-laws that is sufficiently important to command the attention of the Association will, in all probability, bring together a majority of the Association, and if you would strike that out and let a smaller number make amendments, at the same time preserving the feature that they can do so without notice, it would place the power to amend the constitution and the by-laws in the hands of a very small number of men, members—conscientious, careful and sincere in all that they do, but nevertheless they may be mistaken. I do not suppose that our Association can be very much injured by an amendment to the constitution and by-laws, nor would they be, but I think the proposition is as likely as to get together a majority at every one of our meetings. I am rather inclined to think that a majority of our signed members are here to-day. So that it seems to me that the objection is more imaginary than real.

Dr. Moldenke: Mr. President, would it not perhaps be well to make amendments by circular letter and get the returns? You see, Mr. Brown, there may be five members present here of one firm and only have one vote. There may be only fifty votes represented in this whole meeting to-day, in spite of an attendance of nearly three hundred. It is just possible that we may be able to make an amendment readily through correspondence.

Mr. Bell: I would suggest, Mr. President, as this constitution has been just read and placed before the Association, and as many of the members have not had time enough yet to prop-

erly consider it, how would it do to lay it on the table until another time of these meetings? I would move then that the vote on this question be taken on Wednesday evening, as the first business of the session.

The President: Will you put it in the form of an amendment?

Mr. Bell: I move this as an amendment to Mr. Yagle's motion.

Mr. Yagle: I will accept it.

Mr. Groves: Mr. President, I would support the amendment made by Mr. Bell, for this reason: I think you will find by Wednesday evening that it will be necessary to amend Sec. 2 of Art. 2 by the introduction of another name there.

The President: Gentlemen, you have heard the amendment of Mr. Bell and its acceptance by Mr. Yagle. Are you ready now for the question? (Motion put and carried.)

The President: It is distinctly understood, gentlemen, that that is the first order of business on Wednesday evening and we would be pleased to have you look the subject over carefully and to hear of any points that in your judgment need changing.

Next, gentlemen, comes the report of the Committee on the Standardizing Bureau.

REPORT OF THE COMMITTEE ON THE STANDARDIZING BUREAU.

Your committee is happy to report that the benefits derived from the use of the Association's standardized drillings in about 200 laboratories of this country and Europe are being widely recognized and that they are commended wherever used. This more especially for the aid these drillings have given in bringing about a greater measure of confidence in the analyses of furnace and foundry products.

The demand for the Association's standards has been so great that it was found necessary to prepare a second allotment of sample A last January.

The following is the statement of the financial and manufacturing accounts to May 20, 1901:

Total expenses to date.....$609.97
Collections to date 954.90
Bills receivable 24.99

Inventory of drillings ..... 222¾ lbs.

While the Association's standardized drillings have served their end in a most valuable way, there still remains other work in the same direction, and the time seems now ripe for some definite action on the next step. We refer to the instructions received by your committee at the Pittsburg Convention, two years ago, to learn if anything might be done toward the specification of uniform methods in making chemical determinations. This matter was taken up at that time and has been more or less continually agitated by your committee, but action was postponed in order to let the iron chemists get more in touch with each other after using the standard drillings to check up their various methods, and realizing the benefits of uniformity in action.

This is now universally recognized, and there appears to be a desire on the part of many foundry, furnace and pig iron men, as well as chemists to have the work of selecting uniform methods for making analyses pushed ahead as rapidly as possible.

Your committee has been approached so frequently of late on this subject that upon the formal request of Mr. J. O. Henshaw, of N. S. Bartlett & Co., they beg to recommend to the Association that a special committee to represent the interests of the foundry, furnace and chemist be appointed to proceed with this work with a view of presenting a set of standard methods for determining the constituents of pig and cast iron upon which these materials can be bought and sold.

Respectfully submitted,

Thos. D. West, Sharpsville, Pa., Chairman.
Richard Moldenke, New York, N. Y.
James Scott, Pittsburg, Pa.
P. W. Gates, Chicago, Ill.
E. H. Putnam, Moline, Ill.

The President: Gentlemen, you have heard the report of the Committee on the Standardizing Bureau. What will you do with it?

The Secretary: Mr. President, as one of the committee, I cannot well make a motion, but I will say that the work of the standardizing bureau is now known all over the world and has created great enthusiasm and attention. The work was all done by Mr. West and the full credit belongs to him. We are now ready for the next step as announced, and that is the selection of standard methods by which the chemists can analyze the iron with a chance of agreement. So that when you buy a 2½ per cent. silicon iron you will get it without dispute. It has been suggested that we do not announce one standard method for each element, but several each of which leads to the same results, I know there are a number of our friends ready to cooperate with us in this respect, and I suppose a motion to adopt this report and have the committee appointed will be in order now.

The President: That will be all right. The chair will entertain a motion of that kind.

Mr. Bell: Mr. President, I move the report of the committee be adopted, and the committee continued. (Seconded.)

The President: Gentlemen, it has been moved and seconded that the report of this committee be received and the committee continued.

Mr. Groves: I would suggest, Mr. President, before the report is adopted finally, just a slight alteration verbally: Toward the latter end it says, "with a view of presenting a set of standard methods for determining the constituents of pig and cast iron." Now I thought the organization was devoted to the analysis of inorganic material. (Laughter.)

The President: Are you ready for the question? (Motion put and carried.)

The President: Now then a motion will be in order in regard to the other committee.

The Secretary: I move that a committee of three be appointed to take up this question of standard methods of analysis and present them to the Association for adoption next year.

The President: I would suggest that it be incorporated in that motion that the appointment of that committee be vested in

the present committee, inasmuch as they are eminently better qualified to make that appointment than someone else. (Adopted and seconded.)

The President: Gentlemen, it has been moved and seconded that a committee of three be appointed, through the present committee, on the selection of uniform methods for making determinations of the constituents of pig iron and cast iron and report to the next convention. (Motion put and carried.)

The President: I wish to announce, gentlemen, that the chair would be pleased to have the members of the various local associations report their preferences for the nominating committee.

The Secretary: Mr. President, I would like to say one thing further in connection with this report on the standardizing bureau. It may seem strange to our members that we as foundrymen should desire standard methods of analysis, but actually no one else has been able to complete anything in that line. I have been in correspondence with the large societies that have taken this matter up and they have all failed to get conclusive results. Dr. Dudley is chairman of a committee of the American Society of Civil Engineers, who took up this question and they worked for many years to get the chemists to agree upon standard methods, but they failed. So now we are taking upon our own behalf to have something done. Now, of course, if the chemists can get together and agree on something it will be much better, but very many of us are buying pig iron on analysis and we wish to know just what we are getting. They say, "Well, one man gets this result and another gets some other on the same sample. Now, when we get iron on standard specifications then we will see very quickly whether we get it as ordered. This standard method would give us the opportunity of detecting errors in analytical work. Now we want to say to the chemist, "Check yourself by our standard method which can be improved from time to time. This explains why a matter, which belongs to a chemist's association, comes before our foundrymen.

President Jones: The next in the order of business is the report of the Committee on Standardizing the Testing of Cast Iron.

REPORT OF THE COMMITTEE ON STANDARDIZING THE TESTING OF CAST IRON.

Your committee desires to state that during the past year sufficient work has been done to warrant a final report based upon the results obtained, and the conclusions derived therefrom. The magnitude of the operations was fully realized at the inception of the plan, but it was held that the necessities of our industry on the one side, and the constantly growing demands from buyers on the other, fully warranted every effort of time and trouble given to this important subject so vital to our existence. All of the members of your committee are active foundrymen heavily burdened with responsibilities which leave little leisure for the more interesting pursuits of industrial science, yet as little time as possible was lost and only those investigations postponed which were not actually required for the purposes of this report.

We must therefore beg that our report be received and our committee on standardizing the testing of cast iron be discharged; and we beg further that permission be granted to the individual members of our committee to utilize the mass of material collected, for further investigations of interest to the foundry trade and the publication of such results as part of the proceedings of this Association.

Since our last convention there have been made 555 tests, many of which were kindly performed by Mr. H. E. Diller, of Pittsburg, Pa., making the sum total for the complete work 1,601 tests made on 1,229 test bars, not counting the chill pieces and fluidity strips, the whole material handled weighing, roughly, 15 tons. To those of our friends who have helped us so generously we extend our hearty thanks and take exceptional pleasure in stating that beyond publishing our results in the "Journal" this Association has not been asked to make any disbursements for the prosecution of our investigations, your committee having arranged this question in its personal capacity, deeming the outlays but a small return for the honor conferred by you.

There is considerable detail still remaining in the way of tabulations and critical studies of our series of tests made in all the distinctive classes of cast iron. These matters will be attended to and published from time to time in the "Journal."

The results we have obtained have been thoroughly discussed by us and are summarized in the following:

There are two methods of judging the physical quality of castings. First—in the abstract—judging the quality of the iron entering into them; this leaves out the elements of uncertainty introduced by the things which happen after pouring. Second,—in particular—the quality of the casting for the purpose intended. This can only be ascertained by testing the casting itself, or at least the representatives of a given lot. This latter method, of greatest importance to the buying element, will likely always be studied and specified by them, and cannot therefore be well taken up by our foundrymen on the initiative. Nevertheless when such questions arise we should be found well equipped to offer suggestions as to the value of proposed tests, in the light of our knowledge of the physical properties of iron going into castings. Car wheels, car couplers, boiler castings, pipe, etc., are among the numerous things now brought regularly under specifications which insure good results, the tests being made on the castings themselves. As these particular instances, however, will always remain the great minority of the foundry product, the method of testing which will most concern us is that which judges the iron entering into the molds.

Cast iron, so far as its availability for various classes of castings is concerned, depends upon a given chemical composition and a physical constitution dependent also upon the nature of the mixture and the heat treatment. That is, once the chemical composition best suited for the work is determined upon, there still come in the effects of the kind of pig iron used, the proportion of pig iron to remelted material, the steel and other additions, the melting process used, and the kind of molds poured into.

If you will look over the records of tests published by this committee you will see that we have differentiated the various classes of iron into all pig, and pig and scrap mixtures. Then again into cupola and furnace irons, warm and cold blast charcoal, coke and mixed charges. Finally in an arrangement which divides the classes by their chemical constituents. Table 1 shows this more clearly:

TABLE No. 1.

Series.	Class of Iron.	Melted in	Pig Iron Used.	Size of Heat.	Si.	P.	S.
A*	Ingot Mold.	Cupola.	Coke.	60 tons.	1.67	.095	.032
B	Dynamo Frame.	Cupola.	Coke and Charcoal.	60 "	1.95	.405	.042
C	Light Machinery	Cupola.	Coke and Charcoal.	40 "	2.04	.578	.044
D	Chilled Roll.	Air Furnace	Cold blast Charcoal.	30 "	0.85	.482	.07
E	Sand Roll.	Air Furnace	Warm blast Charcoal.	30 "	0.72	.454	.07
F**	Sash Weight.	Cupola.	Coke and Charcoal.	15 "	0.91	.441	.218
G	Car Wheel.	Cupola.	Charcoal and Coke.	10 "	0.97	.301	.06
H	Stove Plate.	Cupola.	Coke.	20 "	3.19	1.160	.084
I	Heavy Machinery	Cnpola.	Coke.	30 "	1.96	.522	.081
J	Cylinder.	Cupola.	Coke.	10 "	2.49	.839	.084
K	Novelty.	Cupola.	Coke.	5 "	4.19	1.236	.080
L	Gun Metal.	O.H.Furnace	Coke and Charcoal.	10 "	2.32	.676	.044

*All pig iron.
**Nearly all burnt scrap originally from charcoal and coke irons.

Throughout the whole line of operations only regularly constituted mixtures were used, the balance of the heats from which these test bars were cast going directly into commercial castings of the classes designated. The results are therefore entirely comparable with daily practice, and are not exceptional cases prepared specially for a good showing. For purposes of comparison green sand and dry sand bars were made side by side even though the iron in practice goes into only one of these classes of molds. It was felt that comparison records were wanted just as much as specifications for the separate lines of product. For this reason also we recommend one standard size of test bar for comparative purposes only, each class of iron being given its special treatment for the information wanted in daily practice, in addition.

Our studies on the shape of the test bar have resulted in the selection of the round form of cross section, and this mainly on the score of greatest uniformity in physical structure, the corners of the square bar introducing elements which become

troublesome, especially in irons with a lower range of the silicon contents. It is fully realized that the work of testing bars, especially transversely, is made more difficult by the adoption of the round bar, but after all this should only mean the taking of proper precautions in measuring the actual net deflection, that is, deducting the upper and lower indentations in the bar by the knife edges, as ascertained by micrometer measurement, from the deflection record.

Now a word as to tests in general. Probably only the larger foundries will be in position to have a complete testing laboratory in connection with the chemical equipment, and these are urged to make their testing records part of their sales departments. There is nothing so potent in preventing burdensome and illiberal specifications on the part of buyers as the ready access to records which clearly show the daily run of work. Not only will customers be encouraged to rely on the ability of the founder to turn out uniformly good work, but the founder himself will be in position to keep up his product to his own desired standard of excellence or look for the reason why if this is not accomplished. The foundries that do not feel justified in equipping themselves even with the good and cheap outfits for transverse tests will eventually have to run the risk of rejections for cause, as they will not know from day to day how their product is turning out in quality so far as the iron itself is concerned. A determined effort is being made by the progressive portion of the foundry trade to retrieve some of the lost ground by improving the quality of the iron entering into castings. In no way can this process be watched better than by applying a standard and comparative system of testing the results.

There is still a further point in the preparation of test bars of interest, and that is the making of coupons from which the quality of the casting to which they are attached is to be judged. This method is used extensively in government work and in the making of cylinder castings. The idea of obtaining material from the same pour in the same mold as part of the casting itself is good enough in theory. Unfortunately, however, this direct connection introduces elements of segregation and temperature changes in the cast iron which make this test less valuable than is generally supposed. At best the iron which has passed through the different parts of a mold before entering the

space for the coupon will not be representative of the whole body, but rather one portion of it only. We therefore recommend the method shown later on in Fig. 1. The metal can be poured from crane or hand ladle clean and speedy and possesses the temperature of the average iron in the casting more nearly than the coupon method now practiced.

Your committee, while giving specifications for the tensile test of cast iron, is of the opinion that the transverse test is the more desirable and certainly within reach of even the smallest foundry. We further would suggest to the mechanical engineers of this country the desirability of standardizing the speed at which the various tests should be performed, and also the urgent necessity of studying the impact test in its various phases. We deem these questions outside of the province of this Association, our work being the selection of methods for getting at the true value of the material we sell without prejudice or favor.

In selecting the test bars for the purpose of specification we have followed the cardinal principle of selecting the largest cross section for the iron consistent with a sound physical structure and within the range and structural limits of an ordinary testing machine.

The following are the sizes of bars selected for tests as a result of our investigations:

For all tensile tests a bar turned to .8 in. in diameter, corresponding to a cross sesstion of $\frac{1}{2}$ sq. in. Results, therefore, multiplied by two, give the tensile strength of per square inch.

For transverse test of all classes of iron for general comparison, a bar $1\frac{1}{2}$ in. diameter on supports 12 in. apart, pressure applied in middle and deflection noted. Similarly for ingot mold, light machinery, stove plate and novelty iron a $1\frac{1}{2}$ in. diameter bar; that is to say, for irons running from 2 per cent. in silicon upward or from 1.75 per cent. silicon upward where but little scrap is in the mixture.

For dynamo frame, sash weight, cylinder, heavy machinery, and gun metal irons, similarly a 2 in. diameter bar is recommended; that is, for irons running from 1.50 to 2 per cent. in silicon, or where the silicon is lower and the proportion of scrap is rather large.

For roll irons, whether chilled or sand, and car wheel metals,

a $2\frac{1}{2}$ in. diameter bar is recommended; that is, for all irons below 1 per cent. silicon, and which may therefore be classed as the chilling irons.

The method of moulding the test bars we would recommend is given herewith:

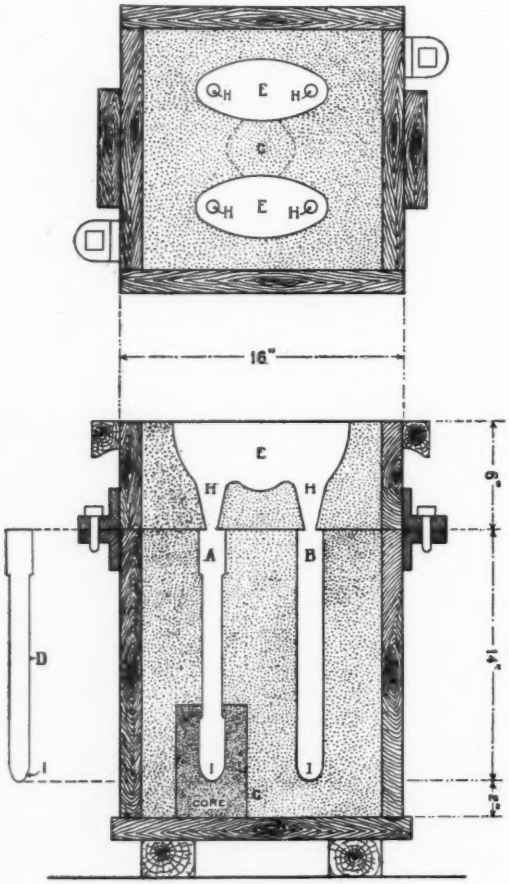


FIGURE 1.

It will be readily understood by every practical foundyman. Both tensile and transverse bars are shown in the same flask. The elevation shows the tensile bar at A and the transverse one at B. The core C is used with the tensile bar in order to ram it on end. A hole in the floor will save an extra parting if desired. In starting to mold up the bars the dried core is set on the bottom board, and then the pattern as seen at D placed into the hole in the top of the core and let rest on its bottom. Now ram up the bar with green sand in the usual manner. The plan shows four bars. This can be modified as desired. If no tensile bars are wanted, the core is avoided altogether. Two bars may be poured at a time, or four, or more, by simply connecting the pouring basin E E as shown by the dotted line G G, in which case, however, the basin E E should be made much smaller. At least three bars of a kind should be made for a given test. The accompanying sketches give all the necessary dimensions. It will be noted that the bottom of the mold is conical as seen at I. This is to present a sloping surface to the dropping iron and avoids cutting.

CORE BOX & TENSILE TEST PATTERN.

These bars could be molded flat and poured on their end by arranging the flask in such a manner that pouring gates and basins can be provided on top. The extra labor to carry out this method would in a measure counterbalance the making of the core C. The only advantage of moulding flat lies in the greater certainty of bars free from swells when made by inexperienced molders.

The sand should not be any damper than to mold well and stand the wash of the iron without cutting, blowing or scabbing. It should be rammed evenly to avoid swells, and poured by dropping the metal from the top through gates or from the ladle direct into the open mold. If the sand will not stand pouring from the top, then pour from the bottom by means of whirl

gates. If there are more than four bars to be poured from the same ladle of iron, where it would take more than two minutes' time in pouring, they should be gated so that the one pouring basin can fill all the gates at about the same time, thus insuring all bars in a set having the same temperature of pouring. After the bars are cast they should remain in their molds undisturbed until cool.

PROPOSED STANDARD SPECIFICATIONS FOR GRAY IRON CASTINGS.

1. Unless furnace iron, dry sand or loam molding, or subsequent annealing is specified, all gray iron castings are understood to be of cupola metal; mixtures, molds and methods of preparation to be fixed by the founder to secure the results by purchaser.

2. All castings shall be clean, free from flaws, cracks, and excessive shrinkage. They shall conform in other respects to whatever points may be specially agreed upon.

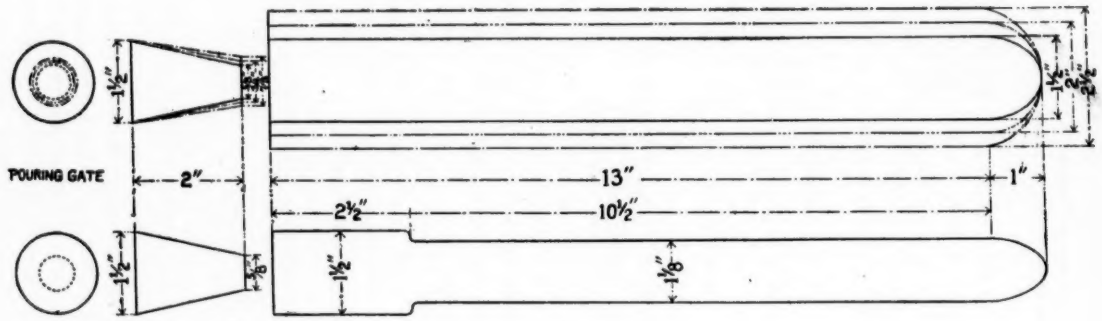
3. When the casting themselves are to be tested to destruction, the number selected from a given lot and the tests they shall be subjected to are made a matter of special agreement between founder and purchaser.

4. Castings made under these specifications, the iron in which is to be tested for its quality, shall be represented by at least three test bars cast from the same heat.

5. These test bars shall be subjected to a transverse breaking test, the load applied at the middle with supports 12 inches apart. The breaking load and deflection shall be agreed upon specially on placing the contract, and two of these bars shall meet the requirements.*

6. A tensile strength test may be added, in which case at least three bars for this purpose shall be cast with the others in the same molds respectively. The ultimate strength shall also be agreed upon specially before placing the contract, and two of the bars shall meet the requirements.

7. The dimensions of the test bars shall be as given herewith. There is only one size for the tensile bar and three for the transverse. For the light and medium weight castings the 1½ inch D bar is to be used, heavy castings the 2 inch D, and chilling irons the 2½ inch D test bar.

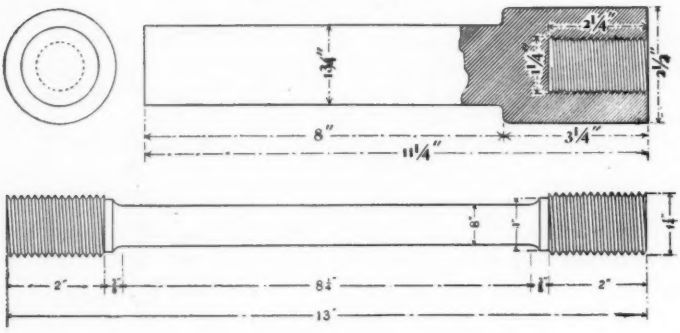


PATTERNS for TEST BARS for CAST IRON.

Steel Socket for Tensile Test of Cast Iron.

TWO REQUIRED.

Test pieces should fit in loosely.



Standard Test Bar for Cast Iron.

Tensile Test.

Cross Section equals ½ square inch.

8. Where the chemical composition of the castings is a matter of specification in addition to the physical tests, borings shall be taken from all the test bars made, well mixed, and any required determination, combined carbon and graphite alone excepted, made therefrom.**

9. Reasonable facilities shall be given the inspectors to satisfy themselves that castings are being made in accordance with specifications, and, if possible, tests shall be made at the place of production, prior to shipments.

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* NOTE. The remarkably wide range of values for the ultimate strength and modules of rupture which are really good for the various classes of iron, precludes the giving of definite upper limits in the specifications. It will therefore remain a matter of mutual agreement in each case, the requirements of service and price per pound paid regulating the mixtures which can be used.

**NOTE. There should really be no necessity for this test, for the requirements of the physical tests presuppose a given chemical composition. It may, however, sometimes be expedient to know the total carbon, silicon, sulphur, manganese, and phosphorus of a casting to insure good service conditions.

These somewhat general specifications are doubtless capable of being modified, but are presented by us to this Association for discussion and possible approval in lieu of anything better now in existence. The specifications should certainly be fair to consumer and founder, and, as experience teaches us better, can be suitably modified from time to time.

From the first outline of our plan of casting test bars, now known so generally, to the final completion of this report we have endeavored to obtain information valuable to our industry, and sincerely hope that much good may result from this, we think, impartial series of conclusions.

And now thanking you for the honor of your confidence in conducting this work of our Association, we beg to remain,

Respectfully,

Richard Moldenke, Chairman.
Thos. D. West,
Jas. S. Stirling,
Jos. S. Seaman,
Jos. S. McDonald,

The Secretary: Now, a point I would like to make, Mr. President, is this: We want to thank our friends who helped us generously in this investigation very heartily, because the work of testing the 15 tons of test bars we have made, outside of the printed reports to this association, has not cost it one cent; we have ourselves paid personally for it, in return for the honor that you have conferred upon us in giving us this important work in hand. Now the committee begs to make this final report. If you wish to discuss and adopt it, all the better, but in any case we would like to be discharged and permission given us as individual members to take the voluminous results we have obtained, to work up later on in the form of papers. We think we have done all we could to get a fair set of specifications which may be adopted by you or modified, and which will serve the purpose of those who want to see specifications adopted.

Mr. Groves: Mr. Chairman, I move a vote of thanks to the committee for their very great effort and their very great results, and that they be discharged. (Seconded.)

Mr. Seaman: Mr. President, before that motion is put, I

would like to have a few words to say in regard to this report, I being a member of that committee, it is probably not my place to do so, but I want to do justice to one man. There are five members of this committee. Our friend, Mr. West, he got up patterns and made the first casting. Each of the other members of that committee made casts, running up to about 15 or 16 tons, as the doctor has been telling us; but when that was done, the other four members of that committee were through with their work and Dr. Moldenke took the rest of it. Now, the work that he did is in that pamphlet. Now, I would like to have special mention made in regard to this matter in favor of Dr. Moldenke, for he has spent not only weeks and months, but several years on this work. The result is here. The amount of figuring, testing and machine work—I know that he went to work at night, spent his nights at the lathe and planer fitting up these samples, making proper tests and everything of that nature. I think that something more than an ordinary vote of thanks should be passed upon the Doctor for these services.

The President: I heartily concur, Mr. Seaman, in everything you say, and it is within your province to amend that motion.

The Secretary: Gentlemen, I really think the thanks are unnecessary. We are all working for science, and therefore for the best interests of our foundrymen. Mr. West has worked equally as hard as I did and is entitled to the same gratitude.

Mr. Groves: Mr. Chairman, I will change that motion, if you would like to have it, to that we give our hearty vote of thanks to the committee for the work they have done, and particularly to Dr. Richard Moldenke, chairman of the committee, for his personal efforts, and that we adopt the report.

(Seconded and carried. Adjournment.)

At two o'clock the forty or more ladies who graced our convention with their presence were handed into carriages and driven about the ports and boulevards of the beautiful city of Buffalo, and in the meantime the afternoon session of the day was opened by the President, who introduced Senator H. M. Ramp, of Missouri. Senator Ramp, who is himself a foundryman, took as his subject, "The Benefits of the American Foundrymens' Association as viewed by an Outsider."

ADDRESS OF SENATOR RAMP.

Mr. President: Ladies and gentlemen:

It is a rare privilege to be permitted to address the foremost men of a great industry like that here represented, but it is rarer still for an outsider, one who knows nothing of the details and inside workings of your organization, to presume to tell you of its benefits; and what is said will, and must be said, simply as an outsider, and as one who has drawn his deductions from the practical effects he has witnessed. Yet, among this body of those who have wrested fame or fortune, or only a living from the sand-pile and the cupola, the able, efficient, successful men of the business, those who represent its progress and upbuilding, I feel strangely at home, and most heartily appreciate this privilege of being permitted to be among you, and learn of you.

The benefits that have accrued to the entire iron industry, through the formation of the American Foundrymen's Association cannot be computed or arrived at by any array of figures. It has had its influence upon our practice in every direction. It has proven a great school, an educational institution, a social institution, and a business institution. It has brought together the foundry men of the East and of the West, with all that implies. It has instilled into the founder of New York greater interests in the founder of Chicago and San Francisco. From all over our broad land—from the everglades of Florida to the pineries of Michigan; from the rocky coasts of Maine to the Golden Gate. It has awakened them to a realization of the fact, that for the greatest success possible, foundry men are dependent upon each other, and must help each other, a trade in which both parties get the best of the bargain.

Co-operation, friendly competition, sound business methods, have been some of its products. True, much remains yet to be done, but during the past six years you have laid the foundation of a structure whose effect has been to raise the standard of the business, to invest it with greater dignity; and has proven of inestimable value to every foundry man, be he employer or employee. Cut-throat competition, the kind that renders justice to neither the employer or his employees, has received its first wound at the hands of this association. Through these

meetings, and the friendly spirit they instill into the members by their personal contact here. it has brought to their notice the fact that they, the trade, or the public are not benefitted by rendering service for less than it costs; that trade is not forced by abnormally low prices and low wages, and that the safety and success of their own enterprise lies more in co-operation, in friendly, fair, competition than in holding their own interests alone so closely to their eyes that it excludes all else from the range of their vision; but like the farmer who raises his product for the public market, they must seek unitedly to sustain, not depreciate.

The employer and employee have been brought more closely together through the influence of this organization than was even dreamed of ten short years ago. A spirit of moderation, of toleration, of equity, is superceding the old desire to fight, and pervading their business relations. The employer is learning through these conferences with his fellows, that he don't always pay the best wages, furnish the best equipment, treat his men more kindly than all other concerns. He learns that other men have poor molders, poor contracts, and their losses in business; and he has also sometimes learned that his employees are men and can appreciate fair business-like treatment, and will often respond more quickly than he expected.

He is beginning to realize more fully that in order to get the best services, the best results, he must protect his men and give them every assistance in his power. On the other hand, the employees, as a direct result of their employer's actions, are learning that their employers are not the hard-hearted Shylocks they have been so often represented. Consideration of his interests, and the value and rights of capital are finding fairer treatment at their hands. They are learning that a firm cannot pay out $3.00 and only get back $2.00; that the employer has responsibilities, and expenses, and hard times the same as they; that the conditions of trade must regulate their demands; and they are not as ready to run into strikes and conflict, incurring bad feeling and loss on both sides, as they were before this organization was perfected and the results of these conferences began to be felt.

This association has been and is now, a true friend to the mechanic. We know it has bettered his condition and added dignity to his calling; it has brought him in closer touch with his

employer; it has shown to both how identical their interests are, and they are marching onward with a greater degree of unity of purpose, with more charity in their hearts, and with more of a "give and take" disposition in their business affairs.

Well can I, though still a young man, remember the day when the founder concealed his improvements from the public like a miser would hoard his gold. If he discovered a cheaper or a better way to do his work he sealed his mouth and built a high board fence around his plant, jealous of the little he had accomplished, not able to take the broad ground that an interchange of ideas and experience would rebound to the credit and benefit of all. He believed he had found something no one else would think of, a monopoly on the brains in the business, and he hugged himself in his own shell. Yet, had he looked around he might have found a dozen improvements, devised by others and applicable to his own business, of far greater value. But this is all changed, for here to-day come the representative men in this great industry, proprietors, superintendents and foremen, all ready and anxious to contribute their mite to the general fund of knowledge, and receive in exchange the assistance, and advice and experience of others, an exchange that is a benefit to all, and is raising the standard of the business from a mongrel nondescript, "go as you please" sort of a trade, to a foremost position among the most scientific and artistic professions of the mechanical world. This association has made better molders, better mechanics and better work. When the heads of concerns begin to exert themselves intelligently in these matters, the effect is felt all along the line. When employers begin to bring their foremen with them to these meetings, and sometimes they have to come to such a place to get acquainted with the man they have worked with for years, they begin to make better foremen and better foremen make better mechanics.

It is an investment that pays well for every concern to send or bring their superintendent or foreman here and permit them to rub up against the brightest minds in the business, for some of the other fellow's knowledge is bound to soak in. It also makes the foreman feel that the employer is interested in his success, and interested personally. It incites him to greater exertions; it stimulates his intellect, and makes him more valuable to his employer and himself.

There are many things I might speak of that have been the direct product of this organization, but the details are better known to you than I. The question of the apprenticeship system, the character of their training, the very foundation of the business, is receiving its share of attention. We see the employers seeking to maintain fair prices and fair wages; we see the comfort and safety of the employee better provided for; we see better foundries built, better equipment installed, and air and electricity do much that formerly was the hardest kind of manual labor. We see the old regime of superstition and tradition in foundry practice being quickly dissolved, and the "why" and "wherefore" of their practice being established, the entire business being systematized and standardized and brought nearer to the point of perfection. And while this association may not be responsible for it all, it has been the most potent factor in the dissemination of practical every day knowledge of the business, that the country has ever known.

Of course these meetings have their drawbacks—all good things do. For here you meet that polished individual that every foundry man blesses at some time or other, as the author of his ills, the facing man. Armed with his samples of facings and cheap cigars, he tries to make you believe plumbago should be mixed one-half clay or the reverse; he warrants his goods not to scab, blow or run out (and they don't), and has always a new kind that just suits your work, and he don't let up until you try it. You also meet the foundry equipment man with his molding machines, patent flasks, air-hoists, and the hundred other devices of more or less merit, who will assure you that they will cut your pay roll in half. You will also meet the fellow with the patent process of making pig iron out of scrap, until you almost wonder if you have not been like Rip Van Winkle, asleep for twenty years and just woke up.

But it's all right, these things just awaken us up to a realization of what our neighbors are doing in the business. These things would not be on the market if they did not possess some merit, or if there was not a possible application for them in some foundries, and through these meetings and conferences you learn much of their real adaptability.

You may not adopt, nor could you if you wished, a hundredth part of what we see and learn; yet, many times the prin-

ciples involved, the application of a new idea helps you out at home, and sends you back to the next convention with an idea of your own.

The foundry men of this country possess one happy faculty: They always select the best place in the country to hold their meetings. This time you have enjoyed the hospitality and good will of the generous-hearted citizens of Buffalo, and at a time when the great Exposition, with its marvels of beauty and grace, with the splendor of its magnificent architecture, with its endless displays of progress and ingenuity and skill of the American people, have been all opened up to you as a magic city, for your amusement and for your profit, standing in countless cases as direct evidence of the ability and execution of your own hands.

And in conclusion let me say, that I trust when you select your meeting place in 1903 you will bear in mind the proud and happy city that sits as mistress of the Mississippi, the gem of the Louisiania Purchase, who expects to have a little show of her own at that time, a city that will welcome you with outstretched arms, and seek to make you glad; and although St. Louis is of the state whose inhabitants have to be "shown," she will greet you with a smile of welcome and "show" to her sister states her progression, and her regard for the honor.

Senator Ramp's eloquent tribute to the unselfishness and thoroughness of our work, and the high motives which guide the conduct of our association were heartily appreciated and applauded. He was given the glad hand of fellowship by his brother foundrymen who wished him God-speed in his brilliant and successful career from the sand heap to the high honors of his State.

The President: The next, gentlemen, in the order of business is the paper on "The Influence of Titanium on Cast Iron," by Mr. August J. Rossi, of New York, whom I now present to you.

Mr. Rossi gave a lengthy abstract of his paper, the full text of which will be found in part 1. of this journal. The interesting discussion which followed is given further along.

The President: Next in order comes the rather important subject of "The Problem of the Moulder," by Mr. J. G. Sadlier, of Springfield, O. At the request of Mr. Sadlier, who wished to

spare his voice for the discussion, the secretary read the paper (see part I. for paper and the end of the pamphlet for the discussion).

Mr. Thos. D. West's paper, which was next announced by the President, was prefaced by the author as follows:

Mr. West: The information as to manganese is rather common, in a way, and it was not with a view of giving you any startling discoveries that this series of experiments were undertaken; it was more with a view of covering as wide a range of grades of iron as possible, so that it might enable those that were confined to some one specialty to have information which was broader than they could obtain in their own practice; and then again that there might be a possibility of making some new discoveries. The way we make discoveries, after all, is by starting in when we do not know really what we are going at. But there are a few things, I think, that have broadened our knowledge and changes our views in some respect regarding the effect of manganese on iron. Before reading these I wish to state here that I was very kindly assisted in this work by Mr. Diller, of the Pennsylvania Malleable Company, Pittsburg, Pa., who has made over two hundred actual tests besides the check work which probably, in some cases, might be over half of the actual number of analyses made. Aside from this, I have had the carbons checked. As all chemists know, it is rather a difficult matter to be certain as to how nearly correct you are, and I therefore thought it would give greater confidence in the paper to have the carbons checked, and we were kindly helped in this work by Prof. Smith, of the Case School of Applied Science, and Mr. Frank L. Crobaugh, of the Foundrymen's Laboratory of Cleveland, Ohio, as well as a chemist right close by me, Mr. Smith. I merely want to mention this work because I think it is due to the gentlemen that they receive some credit for their assistance in the work. I will state that these tests were made in what a great many of you knew as the twin-shaft cupola. I believe it is the only proper way of making comparative tests, especially when we are near sensitive points. Where you melt iron in a cupola to-day and take your tests to-morrow you may have a different condition, in the matter of fuel, blast, and the temperature of the atmosphere; all these things exert a greater

or less effect. By melting, as I did in these tests, in this cupola for comparison, I have one iron on one side of the cupola and another on the other, with the same fuel beneath them and the same blast pressure and the same heat, so that we have a method which gives as uniform results as it is possible to expect.

After the reading of Mr West's paper (see part I.) it was thoroughly discussed. This discussion is given under a separate heading later on.

The President now introduced Mr. Edward B. Gilmour, of Milwaukee, Wis., who read his paper on "The Foundry, its Equipment and Management." The paper is to be found in part I., and the very interesting discussion, under a separate title, a little farther on.

The President now announced the next paper, by Mr. Percy Longmuir, of Sheffield, England, on "The Control of the Foundry," which was read by title (see part I.). He then made a special announcement relative to the train to take the members to the Pan-American Exposition that evening, and the session came to a close.

On the evening of Tuesday, the 4th, the visitors to the convention were the guests of the Buffalo Foundrymen at the Pan-American Exposition. A special train was provided, which took the members and their friends to and from the grounds. The wonderful illumination of the tower and the surrounding court was a sight never to be forgotten, and one could not help but realize the vast importance of the recent developments which have enabled us to harness Niagara for the benefit of a rising industrial center.

On Wednesday morning, at 10.15, another special train took the assembled Foundrymen to Niagara Falls. A band headed the procession down to the train, and gave concerts to and from the Falls. An elaborate luncheon was served at the International Hotel, at the conclusion of which President Jones introduced Mr. Willis Brown as toastmaster. This office accepted, in a happy and humorous little speech, Mr. Brown called upon Mr. Letchworth, who again amply justified his reputation as an after-dinner speaker, his periods following each other as the limpid drops of water dashing over a cascade. Then came Mr. Bell, whose very appearance is a signal for the hearty greetings of his

admiring host of friends. Mr. Bell conveyed to the Foundrymen of Buffalo the sincere thanks of the visting ladies, in the shape of a special resolution to that effect, passed unanimously before the conclusion of the impromptu banquet.

At the conclusion of the luncheon a group photograph was taken, and then parties were formed to enjoy the wonderful scenery on the Falls in the way best suited to the individual taste. On the return in the evening the third session was held.

Wednesday evening, June 5.

The President: The first order of business before the convention this evening, gentlemen, is the matter of constitution and by-laws, as deferred from our meeting of yesterday. Mr. Brown is present, and he will kindly read them again.

Mr. Brown: Mr. President, is it desired to have the by-laws read again at this time?

The President: I think perhaps it would be well. It will not take a great while, and there may be some members present who were not there when the matter was deferred.

Mr. Brown: I will say, before I read this, that the objections which were raised with reference to the amendment clause have been provided for, and will be submitted after the constitution is read. (Reads constitution and by-laws.) Now, the only objection that was raised to the by-laws the other day was a question in relation to the amendments and their method. As was stated by the committee at that time, we believed that the association should have the right, or authority, as it has the right, to amend its constitution at will, provided that amendment is sanctioned by a majority of the association, and I think it is a fair proposition. We meet but once a year. If we had monthly meetings we could then provide for an amendment a month ahead and get it within sixty days, but now we meet but once a year; if we contemplate any change of this kind we ought to be permitted to amend the constitution and by-laws provided there are enough of us present to represent the will of the association. Some one raised the point that we might not have a majority present at any one meeting, which would defeat the purposes. Well, your committee, or a portion of it anyway, beg leave to offer this amendment to you, and I will read the paragraph in

full, as it will be with the amendment added. Section V. of the constitution will experience a similar change:

> "These by-laws may be amended at any regular meeting of the association by a two-thirds vote of those present, provided the affirmative vote represent a majority of the members of the association, and provided, also, that in case the required majority be not present the Secretary shall, within thirty days after adjournment, submit the proposed amendment for ballot by mail."

And of course when that mail is replied to it becomes a ballot of a majority, and whichever way that goes the Secretary can notify the members of the result, and then you will have a majority vote.

The President: There was a motion made yesterday at one time, which was afterwards withdrawn, that inasmuch as there has been considerable work performed by the committee on this constitution and by-laws, that the matter be passed as a whole. Now I would suggest that something of the kind be brought up again before the convention. If, however, there are objections it can be taken up article by article and passed upon.

Mr. Bell: Mr. President, I understand that motion is now before the house. We simply laid the question on the table, and it is now before the convention.

The President: Well, gentlemen, then that being the understanding, it has been regularly moved and seconded that the constitution and by-laws as just read by the chairman of the committee on constitution and by-laws be passed as a whole. Are you ready for the question?

The Secretary: Pardon me, Mr. President, Mr. Stanley G. Flagg, of Philadelphia, before he went away, asked me to present one amendment: "The dues shall be payable annually, not in July, but in June." He thought that would be better.

The President: If desired it could be changed that way, and then let the constitution pass as a whole.

The Secretary: Mr. Flagg stated that in his opinion when a member has paid his dues he feels a good deal more as if he belongs to the association; but if he owes a year and pays after he gets home he won't feel so well.

Mr. Brown: There is just this point, Mr. President. I am almost sorry to raise a discussion that may delay, but speak in

self-defense, as much as anything else. I put the time in July for the very purpose that Mr. Flagg wants to put it in June. I think after you go home from a meeting of this kind, and the Secretary sends a bill out for membership, a man will feel more like sustaining an institution that he has just attended. He feels that it is the right thing to maintain the association, and it gives the Secretary almost the entire year to canvass the field and get new members, so that by the time the end of our year comes around, in June, the Secretary is in possession of the funds for that entire year, and a man comes to the association a member paid for; he does not have to pay anything; he does not feel that he is present at a meeting in May that he will not pay for until July, and then may decide that he does not want to join.

Mr. Bell: Mr. President, the motion as it stood and as it has been again presented to the association, in due form, is subject to amendment, and the amendment as made by Mr. Brown would be properly presented to the association before the question is passed upon as to the constitution. If the amendment, as suggested by Mr. Brown, is adopted, of course then it is a part of the original motion to adopt as a whole. I move that the amendment suggested by Mr. Brown be made part of the constitution. (Seconded and carried.)

The President: Now, gentlemen, we will vote on the constitution as amended. (Motion put and carried.)

CONSTITUTION

ARTICLE I.

Name and Object.

Sec. 1. This Association shall be known as the American Foundrymen's Association.

Sec. 2. The objects of this Association shall be the advancement of the interest of foundry operators, or all who are concerned in the casting of any kind of metal in sand, or loam moulds, for any purpose; to collect for the use of the Association all proper information connected with the foundry business; to interchange experience and encourage uniform customs and actions among foundrymen.

ARTICLE II.

Membership.

Sec. 1. The membership of this Association shall consist of three classes to be called, respectively, active, associate and honorary members.

Sec. 2. Any person, firm, or corporation, engaged in the production of castings of any kind, as employer, superintendent, foreman or chemist, may be elected an active member; and any associate member may become an active member when recommended by the Executive Board and approved by a majority vote of the Association at any regular meeting.

Sec. 3. Any person whose knowledge or services are valuable toward the objects of this Association may be elected an associate member.

Sec. 4. Any individual whose knowledge or services, in connection with the objects of this Association, have made him pre-eminent among his fellows, may be elected an honorary member.

ARTICLE III.

Sec. 1. The officers of this Association shall consist of a president, eight vice-presidents, a secretary, and a treasurer, who shall together form the Executive Board of this Association.

Sec. 2. The eight vice-presidents shall be selected from their respective districts as follows:

(1) New England States.

(2) New York and New Jersey.

(3) Pennsylvania, Delaware, Maryland and District of Columbia.

(4) Michigan, Ohio, Kentucky and Tennessee.

(5) Indiana, Illinois, Missouri, Kansas, Colorado, New Mexico, Utah, Arizona, Nevada and California.

(6) Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Idaho, Nebraska, Montana, Wyoming, Washington and Oregon.

(7) Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma and Texas.

(8) Provinces of Ontario and Quebec, in the Dominion of Canada.

The vice-presidents shall elect one of their number as senior vice-president.

ARTICLE IV.

Sec. 1. There shall be an annual meeting of this Association during the month of May, the date and location of which shall be fixed by the Association at its regular annual meeting; provided, that if no time and place are determined upon at the annual meeting, the Executive Board shall fix the time and place at least three months in advance of the said meeting. Twenty-five members shall constitute a quorum of the Association.

Sec. 2. Meetings of the Executive Board may be called by the president or by any three members of the said Board, and five members shall constitute a quorum.

ARTICLE V.

Sec. 1. This constitution may be amended at any regular meeting of the Association by a two-thirds vote of those present, provided the affirmative vote represent a majority of the members of this Association; and provided, also, that in case the required majority be not present, the Secretary shall, within 30 days after adjournment, submit the proposed amendment for letter ballot by mail.

BY-LAWS.

Duties of Officers.

Sec. 1. The duties of the president shall be to preside at the meetings of the Association and of the Executive Board, and to perform such other duties as usually devolve upon a presiding officer.

Sec. 2. The senior vice-president shall perform the duties of the president when the latter is absent or unable to perform the same, or in case of a vacancy in the office of the president.

Sec. 3. The duties of the secretary shall be to keep a full and accurate record of the proceedings of the Association and Executive Board; to make an annual report at the annual meeting, showing the number of active, associate and honorary

members of the Association, the amount of dues collected, and the orders issued on the treasurer, and he shall perform such other duties as may be assigned to him by the president or Executive Board.

Sec. 4. The duties of the treasurer shall be to take charge of all funds of the Association, and pay them out only upon the order of the secretary, countersigned by the president; he shall report at the annual meeting his receipts and disbursements for the year, in detail; he shall give a bond, the amount of which is to be fixed by the Executive Board.

Sec. 5. It shall be the duty of the Executive Board to manage the affairs of the Association to the best of their ability.

Membership.

Sec. 6. All applications for membership shall be made to the secretary.

Sec. 7. On the first day of each month the secretary shall mail to each member of the Executive Board a list of applicants for membership. If he shall not receive, by the 15th day of the same month, the written protest of two of the members of the Executive Board to any application, he shall then enroll the said applicants as members of the Association, and notify them at once of their election.

Dues.

Sec. 8. The annual dues for each active or associate member of the Association shall be $10.00, which shall be due and payable annually in the month of July. Provided that members of local Foundrymen's Associations, affiliated with this Association, shall be required to pay but $5.00 as annual dues.

Sec. 9. No dues or assessments of any kind shall be collected from honorary members.

Elections.

Sec. 10. All officers of the Association shall be elected by ballot by the active members of the Association at its annual meetings; a majority vote of those voting being necessary to elect.

Sec. 11. All officers of the Association shall hold office for one year from the adjournment of the annual meeting at which

they are elected, and until their successors shall have been elected. In the case of a vacancy occurring in any office during the year, the Executive Board shall fill the vacancy for the unexpired term.

Order of Business.

Sec. 12. The order of business to be observed at annual meetings shall be as follows:

(1) Reading of the minutes of the last meeting.

(2) Announcement by the president of special committees, as follows:

A committee of five to nominate officers for the following year.

A committee of three to audit the accounts of the secretary and treasurer.

A committee of five to report on papers to be presented to the Association.

(3) Report of officers and standing committees.

(4) Report of special committees.

(5) Unfinished business.

(6) New business.

(7) Election of officers.

Amendments.

Sec. 13. These by-laws may be amended at any regular meeting of the Association by a two-thirds vote of those present, provided the affirmative vote represent a majority of the members of the Association; and provided, also, that in case the required majority be not present, the Secretary shall, within 30 days after adjournment, submit the proposed amendment for letter ballot by mail.

Rules of Order.

Sec. 14. Roberts' Parliamentary Rules of Order shall be recognized as authority by this Association.

The President: I wish to take this occasion, gentlemen, to appoint the nominating committee. I should have done so yesterday, but it slipped my mind until after we had adjourned. It will consist of Mr. B. W. Shaw, of Boston, Mass.; Mr. T. J. Best, of Montreal, Quebec; Mr. William Yagle, of Pittsburg, Pa.; and Mr. C. J. Wolf, of Chicago, Ill.

Now, I think before taking up the papers which are to be read and discussed this evening, there are a couple of matters that should be taken care of. One of them is the report of the auditing committee on Mr. Penton's books of last year. I believe that committee is prepared to report.

Mr. Seaman: Mr. President, as chairman of that committee I wish to report that I have no statement made out to show the condition of affairs, but we find that Mr. Penton's books are all right.

The President: You have heard the report of Mr. Seaman relative to the auditing of Mr. Penton's books. What is your pleasure?

Mr. Colby: I move its adoption.

Seconded and carried.

The President: I think no better committee perhaps could be selected for the auditing of Dr. Moldenke's books—Mr. Seaman and Mr. Yagle—inasmuch as they are thoroughly familiar with the matter, and I would therefore appoint them.

Mr. Seaman: Mr. President, there is some business we were transacting yesterday that I think should have a little attention this evening before we proceed to the reading of the papers. I have reference to the reports of our Secretary and two committees. They have made the reports; they have not been acted on by the association; and in order to expedite matters I move that the report of our Secretary be adopted as read.

Mr. Colby: Mr. President, I should like to say that if the Secretary's report has not yet been adopted it would be well to incorporate in the motion favoring its adoption the thanks which were so very generously given to the Secretary for the work which he had done, as evidenced by his report. That ought to be made a portion of the motion in adopting his report, I think.

Mr. Seaman: Mr. President, I will very freely accept that part. I had intended later on to make a motion covering that point.

The President: You have heard the motion. (Motion put and carried.)

Mr. Brown: Mr. President, I beg the privilege of calling your attention to a clause under our new constitution in relation

to the appointment of that auditing committee. I think you made the appointment of two. The constitution provides for the appointment of an auditing committee of three.

The President: Very well. The chair stands corrected, and will add to that committee Mr. Willis Brown.

Mr. Brown: I can assure you, Mr. President, there will be a written report submitted a year from now.

The President: Is there anything further that should come before the convention this evening before these papers are read?

The Secretary: Mr. West's report on standardizing.

The President: Yes, I had forgotten that. The report of Mr. West, the chairman of the committee on the standardizing bureau. I wish to say, gentlemen, in laying that matter before you that it has entailed a very great deal of work; that only those who are more familiar with what has been done in that direction can appreciate the amount of labor that has been devolved upon Mr. West. Mr. West has been a very able and very efficient and a very hard worker in this matter, and I think personally that a vote of thanks should be tendered him in regard to this matter.

Mr. Colby: I should like to make that motion.

The President: Very well. The chair will entertain the motion.

Mr. Colby: That a vote of thanks be tendered to Mr. West for the conscientious work that he has performed as the active member of this committee on the standardizing bureau.

The President: Won't you please incorporate in that the acceptance of the report of the two committees as well?

Mr. Colby: And I move that these reports be accepted with the thanks of the convention.

Mr. Zimmers: I second the motion. (Motion put and carried.)

I think the next order of business is the Memorial on the Grading of Pig Iron, presented on behalf of the Pittsburg Foundrymen's Association, by Thomas D. West.

MEMORIAL.

Presented to the American Foundrymen's Associations in Convention, Buffalo, June 4-6, 1901.

Gentlemen:—

The undersigned, a committee appointed by the Pittsburg Foundrymen's Association, March 6, 1901, to urge the adoption of a more uniform system of grading pig iron, by analysis, on the lines suggested by Mr. Thos. D. West in a paper published by this Association in March, 1901, sent out circular letters to the trade during the latter part of March, asking the following questions:

1. Do you approve of the establishing of more uniform methods for grading pig iron by analysis?

2. Do you endorse the method outlined by Mr. West's paper?

3. If not, please state your opinion as to what division of silicon, sulphur, etc., you think best in the grading of pig iron, and state what views you hold on this subject which you would like to have considered at the convention.

The large number of replies to this inquiry received show that there is a desire for the establishment of more uniform methods and that over two-thirds of those answering the inquiries favor the adoption of the system advocated by Mr. West. However, it is but natural to expect an expression of different opinions, and several other methods have been advocated. Then again, some replies indicate that the exact purport of Mr. West's paper was not understood, though copies of it were enclosed with the circulars. We quote the following extracts from some of the replies received:

A prominent furnaceman replies that he endorses the method but not Table 2, and further says "The sulphur in high silicon iron, Mr. West's No. 1 iron should have a wider range. He has no grade which corresponds to 2.50 Si. .06 S. The sulphur in 1, 2, 3, 4 and 5 have too narrow limits. .01 to .02 sulphur is too low to be considered in grading."

A chemist of a large Iron, Coal and Coke Co. replies: "I think Mr. West in numbering his grades from 1 to 10 and with Si. and S. in the ratio given in Table 2, has hit a system that ought

to be generally adopted. I heartily endorse his paper and his system of grading."

A reply from a leading pig iron dealer says: "We think your sulphur guarantees are too stringent. Why not make the sulphur guarantee in all Foundry iron .05 and under. That is our practice now when we sell by analysis and we find it proves satisfactory."

A well-known foundryman and writer says: Mr. West's suggestions strike me as a good practical solution of a matter which needs immediate attention."

A large Iron and Coal firm replies: "We heartily approve of the idea of a standard system invariably producing the same conditions of analytical proportions for the same grades. But we think your grades have started with sulphur a little lower than average in pig iron now on market."

A prominent and influential founder, after answering questions 1 and 2 in the affirmative, says: "We notice you suggest 10 grades in iron, beginning the No. 1 with 2.75 to 3.00, and making a new grade for each .25 decrease in silicon. Is so close a grading practical or necessary? How do you propose to grade the higher silicon irons?"

A prominent chemist of a large engine and machinery manufacturing concerns says, in answer to question 2: "Consider it too complicated. Would advocate purchases of iron to be regulated by a limit of minimum silicon and maximum sulphur. The adoption of standard methods is in line with other work of the Association and would be of no slight value to its members."

A general founder, answers Yes to question 1, and No to question 2, and says: "Graphitic carbon makes the grade. Sulphur influences the carbons and silicon is mostly a remedy for sulphur evils. Don't it cost more to produce high Carbon (Graphite) than high silicon? Grade by an essential element, not by a medicine that has become essential due to lack of this element. Carbon analyses take time. If we could get them with every car of iron there would be less trouble than when depending on silicon."

A Superintendent of an Iron and Steel Works, answers "Yes" to the first question and to the second, "Not entirely," with the following comments: "How will you grade iron over 3 per cent. silicon, which is our heaviest run? What will you do

with iron whose sulphur limits do not fit the table or will you determine its grade for the available silicon contained? i. e., per cent. silicon less per cent. sulphur increased by 10. It is impossible to run test bars for every cast, but the physical properties ought to be considered, especially the hardness. Carbon should be specified and fracture neglected even though any one brand of iron will always run within the fixed limits of carbon and independent of fracture."

A prominent sales agent says: "The above (referring to ininquiry No. 2) is the only correct way and the best method for all concerned."

A charcoal furnaceman says: "It should be the pride of every furnaceman to establish high standards and maintain them for the different numbers."

A large well known Furnace Co. says: "Ultimately as now the grading so far as the furnaces are concerned, will have to be according to such standards as their customers demand."

Mr. E. H. Walker, of The J. I. Case T. M. Co., sends specifications under which they purchase their irons (which have been published in this Journal not long ago), and adds that he hopes we will be successful in establishing more uniform methods in grading pig irons.

Mr. S. B. Marshall, chemist of the Dunbar Furnace Co., says: "I think Mr. West has the right idea, but he wants too many grades, which is sure to cause more or less trouble. It would be better to have fewer grades and to have a sliding scale for each grade, which would enable you just as well to suit the different demands of customers for their varieties of work required. Enclosed, find a paper with a synopsis of my ideas." (See appendix A.)

The following is the division into grades which was suggested by Mr. West:

	No. 1 Iron.	No. 2.	No. 3.	No. 4.
Silicon	2.75 to 3.00	2.50 to 2.75	2.25 to 2.50	2.00 to 2.25
Sulphur	.01 to .02	.01 to .03	.01 to .03	.01 to .05
	No. 5.	**No. 6.**	**No. 7.**	**No. 8.**
Silicon	1.75 to 2.00	1.50 to 1.75	1.25 to 1.50	1.00 to 1.25
Sulphur	.02 to .04	.02 to .05	.03 to .05	.03 to .06
	No. 9.	**No. 10.**		
Silicon	.75 to 1.00	.50 to .75		
Sulphur	.04 to .07	.04 to .10		

The president of a large corporation operating several blast furnaces, writes as follows:

"In establishing standard grades, the grades to be determined by varying percentages of silicon and sulphur, the variation of only 0.25 per cent. of silicon and 0.01 per cent. of sulphur is calculated to give rise to endless friction between the Blast Furnace Company and Foundry Customer. The conditions of foundry work would not seem to call for so great a refinement, thus rendering the extra expense and trouble unnecessary.

In the hands of average good chemists, working on the same sample of borings, differences of 0.25 per cent. silicon and 0.01 per cent. sulphur or more, are of not unfrequent occurrence. Check analyses of the same chemist will occasionally show this variation, due possibly to the personal equation, as well as to variations in the chemicals used or preparation of sample. Analyses of different sets of borings from identically the same pigs, with equal care and skill on the part of chemists will often vary more than the difference shown between No. 1 grade and No. 2 grade, as suggested in scale, even when same methods of analysis are used. It is assumed that the Furnace Company employs a competent man as chemist, on whom implicit reliance can be placed. It is only fair that the chemist in the employ of consumer should be considered as worthy of the same confidence, else he would not be employed, notwithstanding that many inexperienced and careless young men are found in laboratories.

In the effort to introduce an improved system of grading and arrive at a standard that will be generally acceptable, care should be taken to avoid causes for friction and disputes, due to differences arising from conditions that are apparently unavoidable, assuming that the chemists of maker and user are equally experienced and reliable.

Based upon our experience of the past five or six years, I would suggest that the different grades of foundry iron be distinguished by greater variations in silicon and sulphur contents, as, for example:

Iron over 3.00 per cent silicon, with sulphur 0.03 and under, to be classed as "Scotch."

	Silicon.	Sulphur.
No. 1X	2.50 to 3.00%	0.03% maximum or under.
No. 2X	2.00 to 2.50	0.04 " " "
No. 2 Soft	2.50 to 3.50	0.05 " " "
No. 2 Plain	1.75 to 2.50	0.05 " " "
No. 2 Strong	1.50 to 2.00	0.05 " " "
No. 3 Foundry	1.50 to 2.50	0.05 to 0.10
	Etc. Etc.	Etc.

The retention of the names of grades as commonly known to the trade would doubtless be of advantage, in reducing opposition to the introduction of a standard system or until consumers generally become familiar with the distinguishing features of the several grades as determined by composition."

What is given in this summary should be sufficient to demonstrate that there is a very earnest desire by the trade in general to see established more uniform methods for grading pig irons by analysis and that the time is ripe for definite action. If it is thought that the method of grading suggested above by Mr. West is too rigid or close for present times, then something more liberal might be adopted. However, something should be done that would end one furnace calling a .50 per cent. silicon iron No. 1 while another calls a 4.00 per cent. silicon iron No. 1 also. We believe it desirable to have a committee appointed which can formulate a standard method for grading pig iron by analysis and report at the next convention. We would therefore urge that it be

Resolved, That in view of the urgent demand for a modern system of grading pig iron, a committee be appointed to look into this question and report thereon at the next convention.

All of which is respectfully submitted.

Thos. D. West,
Richard Moldenke,
Committee.

APPENDIX A.

A SYSTEM OF GRADING PIG IRON BY ANALYSIS BASED ON A "SLIDING" SCALE FOR SULPHUR AND A MINIMUM LIMIT FOR CARBON.

By S. P. Marshall, Dunbar, Pa.

"SOFTENERS" over 3.00 Silicon, under .050 Sulphur (Sliding Scale.)

	Silicon with Sulphur.		
No. 1 Foundry Iron.	1.70	"	.010
	to		to
	3.00	"	.050

Total Carbon over 3.20
Graphitic " " 2.75

An increase of .10 Silicon for every .003 sulphur.

Silicon.		Sulphur.
1.70	with	.010
1.80	"	.013
1.90	"	.016
2.00	"	.019
2.10	"	.022
2.20	"	.025
2.30	"	.028
2.40	"	.031
2.50	"	.034
2.60	"	.037
2.70	"	.040
2.80	"	.043
2.90	"	.046
3.00	"	.050

	Silicon with sulphur.		
No. 2. Foundry Iron.	1.20	"	.005
	to		to
	2.20	"	.055

Total Carbon over 3.00
Graphitic " " 2.50

An increase of .10 Silicon for every .005 Sulphur.

Silicon.		Sulphur.
1.20	with	.005
1.30	"	.010
1.40	"	.015
1.50	"	.020
1.60	"	.025
1.70	"	.030
1.80	"	.035
1.90	"	.040
2.00	"	.045
2.10	"	.050
2.20	"	.055

	Silicon with Sulphur.		
No. 3 Foundry Iron.	.70	"	.005
	to		to
	1.70	"	.055

Total Carbon over 2.75
Graphitic " " 2.00

An increase of .10 Silicon for every .005 Sulphur.

Silicon.		Sulphur.
.70	with	.005
.80	"	.010
.90	"	.015
1.00	"	.020
1.10	"	.025
1.20	"	.030
1.30	"	.035
1.40	"	.040
1.50	"	.045
1.60	"	.050
1.70	"	.055

	Silicon with Sulphur.		
"Grey Forge."	.50	"	.025
	to		to
	1.50	"	.075

Total Carbon over 2.00
Graphitic " " .075
An increase of .10 Silicon for every .005 Sulphur.

Silicon.		Sulphur.
.50	with	.025
.60	"	.030
.70	"	.035
.80	"	.040
.90	"	.045
1.00	"	.050
1.10	"	.055
1.20	"	.060
1.30	"	.065
1.40	"	.070
1.50	"	.075

The discussion on this very important topic will be found in another portion of the proceedings. On resolution, the committee was continued with power to increase its number, and is asked to report at the next convention.

The President: Mr. Ramp not being present, we will simply read the remaining papers by title only—"Green Sand Cores," by P. R. Ramp, of Aurora, Ill.; "The Economic Status of Wages, by E. A. Putnam, of Moline, Ill.; "Foundry Metallurgy," by H. E. Field, of Ansonia, Conn.; and that of "Melting Brass," by Mr. C. Vickers, of Chicago, Ill.

Mr. Lannigan: Before we adjourn, Mr. President, let me relate a little story I know of two boys. Our custom of thanking our active members leads my mind to this. I knew two boys intimately when I was very small myself, who were pretty closely held under their employer's thumb, and he would frequently call one of the two boys to run about two and a half miles on errands, and then he would come back and the man would say, "Thank you." One of the boys one day had the courage to say that "Thank you" never bought bread and butter for me. So I think that this also applies to the men who do all the active work for our association. (Laughter.)

The President: I think, Mr. Lannigan, the moral is very applicable. If there is nothing further to come before the convention this evening we will adjourn until 10 o'clock to-morrow morning, and I would like to say to the members present that it is very much desired that we make this "10 o'clock sharp," inasmuch as we want to get through entirely by noon. The convention is therefore considered adjourned.

Thursday, June 6, 1901, 10 o'clock.

The President: The gentlemen will come to order. It is now some time past the hour set for the opening of the convention this morning. I think we had better proceed. I wish to say that I have just received this morning a telegram which I will read: "W. A. Jones, President American Foundrymen's Association, Hotel Niagara: Greeting and best wishes for the success of the convention. Philadelphia Foundrymen's Association." I think, gentlemen, this should be responded to, and I will appoint Mr. Brown and Mr. Yagle to draw up a suitable reply to this telegram.

I think, gentlemen, on the other program that was sent out there was an announcement that appeared there of a paper on "Insurance of Patterns." This paper did not come in until this morning, when it was handed to the Secretary, but the author of it, Mr. F. Conlon, is present, and we will ask him to make a few brief remarks on the subject. (See part I. for this interesting paper.)

The Secretary: I would like to say, Mr. President, in connection with Mr. Conlon's paper, that the time being so short it was impossible to print it now, but it will be published and distributed, and we hope during the year to receive discussion in the shape of writing or otherwise on this subject, possibly to bring it up before the next convention and get some definite action upon it.

The President: The next on the programme is, "The Engineer in the Foundry." I would like to call your attention at this stage of the fact that it has been considered very advisable to get through with the business of the day at noon, if possible, as there are quite a number who wish to take the early trains this afternoon out of the city.

Mr. Groves now gave his interesting talk on the foundry methods in use in his works. It is hoped that we will very soon be able to publish this discourse in detail

The President: I am sure, gentlemen, we have enjoyed the paper of Mr. Groves very much, indeed. I think it has been highly beneficial. The next item, "Foundry Costs," will be read only by title, inasmuch as it is here before you and the writer

is not present. The same applies to that of "Foundry Mixtures" and "The Relation of the Laboratory to the Foundry." The Secretary, I think, wants to make a few remarks relative to the next item, "The Tropenas Converter Steel Process."

The Secretary: Gentlemen, I wish to announce that I received this morning a paper from New York on the Tropenas Process. It came by registered mail, and, of course, is entirely too late to bring up, but I wish to announce that we will get it in shape and have it printed and sent to the members later on.

The President: I think it would be highly in order to tender to the gentlemen who have favored this convention with their papers and their discussions a vote of thanks. It has been so suggested, and certainly meets with my approval, and I would be pleased to entertain a motion to that effect.

Mr. Beckwith: Mr. President, I would move that a vote of thanks be tendered to all those who have presented papers at this convention and contributed to their discussion.

(Seconded and carried.)

The President: Here is a matter that I think should be taken up at this time. It has been intimated to me that the Secretary is contemplating a tour in European countries during the present summer and fall. He will probably be over there, if he can make arrangements to get away at all, a couple of months, and it has been thought best and a wise move that he should be fully empowered to represent this association while abroad. I would like to hear from the members present relative to it.

Mr. Seaman: Mr. President, I think, owing to the well known fact of the interest that our Secretary has taken in this organization since it was begun, that there should be no question at all about giving him that authority, and I make the motion that he be fully authorized to represent the American Foundrymen's Association anywhere in Europe.

Mr. Sadlier: I second the motion, Mr. President.

The President: It has been moved and seconded that the Secretary be fully authorized by this convention to represent its interests in foreign lands wherever he may be.

(Unanimously carried.)

The Secretary: Mr. President and gentlemen, I beg to

thank you very kindly for this expression of confidence. I had intended to go to the convention of the International Society for Testing Materials, at Buda Pesth, if I can get off at all, and, of course, I would be glad to represent the American Fondrymen's Association there personally as well as through the American branch of the International Association, to which we belong. That is why I am very thankful to you for your kind expression.

The President: Another matter that I think would not be out of place to present to you at this time is the absolute importance of individual effort to secure a wider membership for this association. It is a well recognized fact that the National Founders' Association has been built up very largely by the individual effort, the individual application of members. The Secretary may send out circular after circular and it will be recognized as coming simply from the Secretary of some association, and it will not receive that weight, that consideration that it would receive were you to bring the matter up directly between yourself and your neighbor. I think there is no question but that every member here could secure, between now and the next convention, anywhere from one to a half a dozen applications if he would simply give the matter a little time; and the worthiness of the matter is something that I do not propose to dwell upon one minute. I think that is a well recognized fact.

We will proceed under the head of "Unfinished Business," if there is anything under that head. Personally I know of nothing.

The next then would be "New Business."

Mr. West: Mr. President, under the head of "New Business," I wish to call the attention again of this convention to the subject we had up here with reference to technical schools for training foundrymen. It appears that my remarks in one of the discussions bearing on that subject have started some thought, and there has been a wish expressed that the matter would be carried forward. Mr. Groves, in his paper this morning, has made a remark also in the discussion which I think may be misunderstood. He seems to have the idea that in educating the foundryman to keep up with progress that the sentiment prevails that he should be a thorough, practical chemist. I do not know what others' ideas are on that point, but I know my own

are not in that direction. While I have advocated strongly that a foundryman should know something of chemistry, it was never with the idea that he should be a practical chemist. The foundry foreman, or the foundry that is managed by the foreman, who is competent to direct the chemist, or the draughtsman, as he would the blacksmith, the machinist or pattern-maker, is the best equipped when in a position to most economically produce their castings. When you commenc to divide the responsibility of foundry work between two or more persons, you commence at once to have contention and trouble. For that reason I believe that some steps should be taken to keep up with the progress of foundry science whereby there would be an opportunity given to educate the foreman so that he would be able to utilize the chemist and the draughtsman as he may need. Mr. Groves has sketched out here for us methods for making castings and the need of the mechanical engineer in the foundry. There is certainly need for such men at the present day. But the foundryman himself ought to be advanced in a much larger degree than he is, to be the companion of the mechanical engineer in using his knowledge. I believe that it is practical for us to have a school wherein all classes of work can be made in such a way as to teach principles, not with a view of making a perfect mechanic on one specialty of work, but that he shall be given a broad knowledge of founding, and then in the evening he can have teachers who will give him lessons in drawing and on chemistry, in fact, carry him far enough so that he will be able to direct and study intelligently anything that comes up on the subject. And then, further, there can be some effort made as to the matter of educating in management. Now, I do not believe to-day that our colleges touch on the subject very extensively. I know that a man may have to start in business, and I have come in contact with very bright men who have spent the best part of their lives in colleges, but when it came to handling men, intelligent as they were, they were deficient in that kind of knowledge which they should possess to get the best results. One-third of our strikes to-day are wholly due to that lack of knowledge, for by allowing workmen to take advantage, they will attempt things that they would not think of if they thought that the head of their concerns were competent enough to do without them. I believe there is room in the progress of the art of founding for

such a school. It is rather indefinite to say just what steps should be taken; we cannot tell what should be done until we try; but I do believe there ought to be some effort made. Therefore I would make a motion that this body appoint three members as a committee to take up this work and to give them power to do what they can in any direction they can to advance such a cause, to report at our next meeting.

Mr. Best: Mr. President, for some years past, in Montreal, we have had schools, for one dollar a season; any boy or man can go two nights a week; he can obtain instruction in mechanical drawing right through the season of four months. At the end of that season, if his attendance has been 90 per cent. of the time and his drawings are fairly well advanced, that dollar is given back to him; and he has received free tuition. The best teachers to be obtained in Montreal are selected for those evenings during the session. Now, there is another place where for $5.00 a season instruction can be had in mechanical drawing, in chemistry and in different processes of mechanical work. Strange to say, there have been but few who have availed themselves of the opportunities offered—but very few. Then, again, there are establishments in the city of Montreal, as elsewhere, I suppose, one of which is our own place, where we have fitted up a room at the expense of about $500, and well equipped it with blackboards and other school room fixtures and got the foreman of each department to come along and say, "Now, boys, if you will come three nights a week we will give you free instruction; we will try to do the very utmost in our power to elevate you from where you are, raise you up to be better men." Well, these boys took it into their heads that we were going to learn something ourselves. I personally went to them, and said, "Now, boys, it is true if you come along I shall obtain great benefit from it," because in trying to disseminate knowledge we must obtain knowledge ourselves. No one can practically give knowledge without receiving it in the transmission of knowledge to others. But, strange to say, I couldn't get a boy in the establishment, out of about sixty of them, to come along to spend one night, and we had to let the whole matter go. Now, it is a difficult matter, I say, to try to get boys that are being trained as molders or being trained as mechanics in any department of mechanism, to see

the utility of providing for the future. I would be very glad if something could be started that would put interest enough in the boys to look a few years ahead. The advantages to-day are five times, aye, a hundred times, in excess of what they were thirty-five or forty years ago, when I was a boy. Now, if something could be done I think it would be one of the grandest achievements of the age.

Mr. Seaman: Mr. President, I would say just a few words. As is well known, we have in Pittsburg, now plans being made for an institute, the means for which is being furnished by Andrew Carnegie, who has already donated about seven millions of dollars toward this object, with the promise of as much more as will be necessary. The Pittsburg Foundrymen's Association has taken this matter up and appointed a committee: that committee waited on the board of directors of this Carnegie Institute; they informed us there that they were not ready yet to say what was going to be done, as their plans were not complete, but that the foundry part would be one of the important points that they were taking up. I will say that there are on that board of directors three foundrymen, and I think our interests will not be neglected. Now, there will be an institution by which this matter will be taken up because there all parts will be taught, from chemistry to engineering, founding of all kinds, perhaps of iron and steel; and if there be a committee appointed here to-day I think that Pittsburg would be the point for them to come to investigate to see what is being done by the foundrymen of the United States

The President: I would like to ask Mr. Seaman are any of the members of the committee to which you refer members of this association? You say that at least three members of that committee are foundrymen.

Mr. Seaman: They are all members.

The President: Well, I think that the American Foundrymen's Association is to be congratulated.

Mr. Seaman: I think I can mention the committee, if it is necessary.

The President: I would be pleased to know them.

Mr. Seaman: The committee consists of Mr. Yagle, Mr. Zimmers, and myself.

Mr. Groves: I would like to say a word here, not by way of controversy at all, but for the last six years I have had something to do on the lines that you have been sketching here. There is a photograph there on the wall showing about 150 young men there, students of mechanical engineering. For the last six years there have passed through my hands, I think, somewhere between seven and eight hundred of our young fellows in Pittsburg, through all the various departments, and I trained them completely, at least as far as my knowledge would go, in mechanical drawing, in applied mechanics, and in the elements of metallurgy. I do not know whether our friend, Mr. John Laughlin, of Jones & Laughlin, is here to-day, but I trained his assistant in my classes. In our own foundries I have had the pleasure of training two of our own assistant foremen, and it has been a pleasure not only to myself, but to those around about us to show what an advantage it is that these men can go back into the foundries and can sketch and draw and lay down their work. What I want to make out is this: Mr. West does not want to misunderstand me about this matter at all—it is a well known old aphorism and it is true, that a little knowledge is a dangerous thing, and if you are only going to give your foreman a certain smattering of the elements of these sciences you are going to give that fellow the swelled head and he is not going to be talked to by the manager or anybody else very largely, unless he be a man whose head is level. Now, I have seen that. I believe, with Mr. West, that a foundry foreman cannot be too intelligent and he ought to have a knowledge of the elements of chemistry, of the elements of metallurgy, be able to draw decently and to understand these things; but I believe what is wanted is that the associations should try to persuade the firms themselves to do what Mr. Best has been trying to do but failed to a certain extent in doing. Our people down there in Pittsburg have made up their minds that our students, our apprentices in our establishments, in our machine shops, our foundry and our pattern shop, that they shall be taught at evening classes on the spot. Now, our Westinghouse Electric Company, with which I am not connected, the electric department, they have been conducting now for two years a series of evening lectures for the students, in electricity, and if you could only see the enthusiasm among the boys, the young fellows! It is a limited

scholarship and the young fellows who wish to get into it have to do certain things, and if you could see the rivalries to get the knowledge that is being laid out for them by the Electric Company, why it is a delight. And my view is this: That no school, no public school will be able to draw our boys out in that way to their shop. If a boy is going to be an apprentice, it should be in the terms of his apprenticeship when he comes into that establishment, if it is a large establishment, that whilst he is there serving an apprenticeship as a molder, pattern-maker, or machinist, that he shall be expected to attend these evening classes provided for him by the firm, at a nominal rate. I believe that that will solve the question of apprenticeship that we are talking about, training our boys properly, because at these evenings either the foreman molder or some one can be with them, who will be there to give the best practical knowledge, and men for that purpose can be obtained. I believe that is a line our association ought to take up, and the committee I think would be well advised to recommend all founders throughout the country that they organize classes in their foundries for the training of their own apprentices.

Mr. Sadlier: I want to endorse Mr. Groves' statement. I believe that every foundry management should make their shop a college in which their apprentices are educated. I believe that the true college of education is right where the work is done, and I do not think if this is carried out that we will have any question about getting competent foundrymen.

Mr. West: Mr. President, our two members here, Mr. Best and Mr. Sadlier, show us exactly where we stand on that point. Mr. Best has made an effort to do what Mr. Sadlier advocates and he has failed, and that will be found the rule generally, but if we go to work and make a school—you may call it so if you wish—purposely for that work, where you can obtain a large variety, where a father can send his son knowing that he is going to a place where he gets the broadest knowledge possible, and he is going there not merely as a dirty apprentice, but he is going there, you can say, to a technical school, where he is going to obtain knowledge under instructors who have got the creative ability (that is especially what is wanted, is creative ability to originate methods). We have all over this land many technical schools to teach founding, but they just come under

the head of the remark of our friend, Mr. Groves, that a little knowledge is a dangerous thing. He has applied that to the chemist and we can apply it to the founding, the same way. But what we want to-day is to overcome that, to find out where the limit is and to draw the line where it should be. Now, I believe there should be origination, there should be creative ability. I would not waste my son's time in the present institutions we have teaching founding. A little knowledge is a dangerous thing with them. They are taught just a little to pound sand. I could take any boy in a foundry and in two days give him all that he would ever obtain in there. But we have got to broaden out in those lines. And it is just as Mr. Best says; he has tried it; and you cannot hold the present American boy down to such a thing; but if he sees a grand institution where there are the best teachers of the land and that it is covering all classes of work, you are not wasting his time. It is simply leading him on. You have got his work systematized; there are certain principles taught in one department, certain principles taught in another, and he goes up step by step and he realizes he is there learning something; he realizes that there is an institution which is endorsed by the best, practical minds in the country. And I think when we get such an institution as that, that father can send his sons there and the sons will be glad to stay there. And another thing, they will not be wasting the best part of their lives as men have got to do by college study. They study up till they are twenty-five or thirty years of age, and then go out into the world and look for something to do. If we have an institution of that kind a man only needs, after the boy has come out of the grammar school, to send his son there; he does not waste the best efforts of his life teaching him something he cannot use, but he can send him there and let him give four years to study, and when he gets through an institution, such as I have in my mind, I think when he steps out of there will be plenty that will want him and will want him at a good salary, too.

Mr. Brown: I have no doubt the institution as contemplated by our friend Mr. West would be a great thing, but it would be a great thing to establish. You would come pretty nearly wanting the State treasury or the national treasury back of it, and I apprehend a school of that kind would have more

professors than pupils. Our private schools, scattered all over the country and managed by private parties or maintained by the States, for the next fifty years or a hundred years will probably offer all the advantages that are practical. It is unfortunately true that in this country we do not estimate our education from any other standpoint than the dollars and cents that it brings us. That may not be the highest standpoint for an education, but it is the practical American standard and that will continue to be. The boy who wants to educate himself will hunt that education, and you may make all the schools you are a mind to, you cannot get the boy to go there. It is like the leading of a horse to the trough; you may lead him, but you can't make him drink; and I believe, as has been said on the floor, that the correct solution of all that is to inspire your own boys, your apprentices, to attend the schooling that they can get right at home or in their own neighborhood. In the meantime the average number of boys have got to in the meantime support themselves or be supported, and you could not send them away from home; you could not unite them all in a school of that kind. Therefore they have got to educate themselves while every day they are working.

The President: Gentlemen, you have heard the question.

Mr. West: I would like just one more word, Mr. President. I would say that I did not mention the financial part of that, but such a school as I have in mind I would say would be self-sustaining, and I have very little doubt but that it would probably pay in time a good dividend. At least I think I could manage such an institution.

The President: Are you ready for the question?

(Carried.)

The President: Inasmuch as Mr. West is thoroughly in earnest in this matter and is better prepared perhaps than anyone else to select a committee to act in conjunction with him, I think it would be wise to appoint Mr. West the chairman of that committee and allow him to make his own selection for the remaining members of the committee.

Mr. Brown: Mr. President, your committee to whom was referred the matter of the response to the Philadelphia Foundrymen's Association, beg leave to submit the following:

"To the Philadelphia Foundrymen's Association, Philadelphia, Pa.: Thanks for congratulations. We are having a large and enthusiastic convention. Philadelphia foundrymen conspicuous by their absence. Why should this continue to be, when the American Foundrymen's Association was inspired by you and organized in your city?

"American Foundrymen's Association."

The President: I think the report of that committee needs no further action.

Mr. Groves: Mr. President, do not let us be under any misunderstanding about this Philadelphia dispatch. We have had three members here—Mr. Evans, Mr. Hanson, of the Pennsylvania Iron Works, were here, and Mr. Flagg was here. We had three members here. There is another gentleman here now. Don't let us get a misapprehension that any section of our organization is backing out of the thing.

The President: The next in order is the report of the nominating committee.

Mr. C. I. Wolf, Chairman of the Committee on Nominations, then made the following report. He also stated that Mr. Howard Evans had not consented to a nomination as Treasurer:

President, J. G. Sadlier, the Springfield Foundry Co., Springfield, O.

First Vice-President, New England States, Theo. H. Colvin, Colvin Foundry Co., Providence, R. I.

Second Vice-President, New York and New Jersey, Walter F. Prince, H. R. Worthington Co., Elizabethport, N. J.

Third Vice-President, Pennsylvania, Delaware, Maryland and District of Columbia, S. D. Sleeth, Westinghouse Air Brake Co., Pittsburg, Pa.

Fourth Vice-President, Michigan, Ohio, Kentucky and Tennessee, C. A. Bauer, Warder, Bushnell & Glessner Co., Springfield, O.

Fifth Vice-President, Indiana, Illinois, Missouri, Kansas, Colorado, New Mexico, Utah, Arizona, Nevada, California, E. W. Smith, Crane Co., Chicago, Ill.

Sixth Vice-President, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Idaho, Nebraska, Montana, Wyoming,

Washington and Oregon, Edward B. Gilmour, E. P. Allis Co., Milwaukee, Wis.

Seventh Vice-President, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas, J. P. Golden, Gilden's Foundry and Machine Co., Columbus, Ga.

Eighth Vice-President, Provinces of Ontario and Quebec, in the Dominion of Canada, T. J. Best, Warden, King & Son, Montreal, P. Q.

Secretary, Dr. R. Moldenke, New York City, N. Y.

Treasurer, Thomas D. West, Sharpsville, Pa.

The President: Gentlemen, you have heard the report of the committee on nominations. What is your pleasure in regard to it?

Mr. Zimmers: I move to adopt it.

Mr. Bell: I believe it is required, Mr. President, that the vote shall be by ballot, and if the gentleman will make his motion to authorize the secretary to cast the ballot of the association in favor of the officers named, it will facilitate matters.

Mr. Zimmers: I move the secretary be authorized to cast the ballot for the gentlemen named.

Mr. Bair: I second the motion. (Motion put and carried.)

The Secretary: Mr. President, the ballot is cast.

The President: I think a few remarks from our new President will be in order. I will state, Mr. Sadlier, that by the adoption of the report of the committee on the new constitution and by-laws, I am reluctantly compelled to hang on to this chair for the remainder of this session. I invite you to a seat on my right, after your remarks.

Mr. Sadlier: Mr. Chairman and Gentlemen, you can hardly appreciate the embarrassment that you have placed me in. There is no question but that there are many of you more capable, more competent to fill the honored position of President of the American Foundrymen's Association than your humble servant. I certainly appreciate it. There is nothing to-day that I know of that I could feel more exalted over than to be placed in the position in which you have placed me. My life has been spent in the foundry; I expect to spend the remainder

of my days there. I certainly appreciate the honor and thank you for the unsolicited confidence that you have given me.

Mr. Bell: Mr. President, I offer this resolution: Resolved, That the hearty thanks of this association be and are hereby extended to the local committee of the Buffalo Foundrymen's Association for their very able preparation for our entertainment, and especially would we thank Mr. O. P. Letchworth for his unfaltering attention to our entertainment.

Mr. Seaman: I second the motion. (Carried.)

The Secretary: Mr. President, I would also like to thank the members of the American Foundrymen's Association for their compliment in re-electing me to the secretaryship. I will try to do just as much and more than last year, if possible.

The President: We all know you will. It may not be out of place at this time, just prior to our final adjournment, to ask for an expression of opinion in relation to the location of the convention for the coming year. If there are any gentlemen present who have anything to say on that subject we would be pleased to hear from them.

The Secretary: Mr. President, it is possible that I may say a few words on that subject, from what I have heard among the members. It seems to be the opinion that we would either like to go pretty far south at this time, or pretty far east. The points of Chattanooga and Birmingham in the south have been talked of, and Boston in the east. Now, if arrangements could be made by which possibly the Tennessee Coal & Iron and Railway Company could give us a train at some point north, to go down and back in a body, it might be possible to go as far south as Birmingham. But I have no actual facts and figures except an invitation of the Board of Trade of Chattanooga, to come down there. So that unless there is something special that comes up, I suppose the executive committee must take care of this matter.

Mr. Seaman: Mr. President, I want to say, in connection with this invitation from the Board of Trade of Chattanooga, that possibly it was through me that that invitation was extended and for this reason: A year ago when we were discussing the point of where to meet for the next convention, I happened shortly after to be in company with some of the iron men

from that district, and I told them that there had been some talk among our members about meeting in Chattanooga at the next convention; I told them I did not know what the result would be, but it had been talked of; and I was assured that if we would give them notice, that they would give us such an entertainment as we have never had before, something new and entirely different. Now, the gentleman with whom I was talking, being down there and being a member of the board of trade, possibly extended this invitation. Now, while it is very nice to receive an expression of that kind, I want to say right here that my experience has been, since we have been meeting in these annual conventions, that there is a little too much time being spent on entertainments; I think if we had less entertainment and more business we would do better, and if we had less entertainment we would have opportunities of meeting at points that we cannot now touch for the people will not do anything for fear we may expect too much entertainment. Now, I think if this thing were known, possibly, and some action taken to discourage so much entertainment, that we would have better success, brighter meetings and that more work could be done.

The President: There is one thing further that I would like to call attention to and that is the tone that has been added to this convention by the presence of so many ladies. Never before have we achieved that amount of success. It has been tried each time, and the question has been asked me a number of times during the season, what are you going to do in regard to the entertainment of the ladies, or are the ladies expected to come? and, really it was a question which was a hard one to answer. There was an effort made, as I say, to get the ladies out at the last conventions, and those who did attend were royally entertained by Pittsburgh. In Chicago there was very little done. And I would like very much to see just as strong an attendance of the ladies at our next convention as it is possible to get out.

Mr. West: Mr. President, I would just like a few words on that point. I heartily agree with my friend, Mr. Seaman, on cutting down the entertainment, but if we do that I think it would kind of run up against your proposition for bringing out the ladies. I think we should combine the two as much as pos-

sible. But if we get the ladies out we are sure to be benefited in every way. But I think that most of our members look forward to this convention as an outing. They work hard all the year and probably save up their nickels to come here and they want a good time. It is very well to have a literary feast and our papers; at the same time we want to have a little pleasure, and I think there ought to be an effort made in both directions to make them just as strong as we can.

Mr. Brown: In view of saving time when we get together at our conventions, it occurred to me at this time, would it not be better to have these papers printed as they are distributed—let, for instance, the secretary send a postal card to every member who cares to read these papers before we get together; then let us have those papers two weeks before the convention. We can read them over carefully at our homes and then when we get here, have them read simply by their titles and let the discussion take place at once. It is quite a tedious process, after you have read a lengthy paper, as many of us have, to again listen to it while it is read here; not only that, but it consumes time, and really the value we get is from the members on their feet, and the interchange of opinion and the argument is often worth many times as much as the article itself; and if time could be saved in that way it would be more than replaced by the benefit we would get by interchange of opinion on the floor.

The Secretary: Mr. President, I would like to add a few remarks to Mr. Brown's statement. There is only one difficulty —all would be well if I could get the papers in time to print them ahead. If we could get the papers quick enough, and then simply instead of reading them by title have the secretary undertake to make a short synopsis of what is in them; say a matter of two or three minutes reading; then much time would be saved.

Mr. West: Would it not be a good idea, Mr. President, to empower the executive committee to determine on some date which shall close the reception of papers? I do believe it would be a big point for the members of the association to have the opportunity of reading the papers before they come here to the meeting, because there are many things then that they can get a chance to study up and to assure themselves. Members here will

hear a paper read and they will think, "that it is not right, if I had only had that paper before and had a little time to look it up, I would have known something about it," and if they had had the paper and they had come here prepared, our discussions would have been extended; and I agree with Mr. Brown that the snap of the convention is the life given by the discussion.

Mr. Bell: Mr. President, I fear this plan of distributing the papers prior to the meeting of the association will have a very injurious effect upon the attendance. If our members can read the papers at their homes, they will not want to go to the expense and spend the time of attending the convention. Now, if those papers are ready for distribution on the first assembling of the convention, or the day before, people can read them here and note what criticism they wish to make, and surely that would be time enough. I do not want to spread out the best part of the convention and give it to the members without their attendance. We want a large attendance because where we have a large number we have a great variety of thought and that thought is the best element of the convention. Of course, the papers are desirable because they are the foundation of the discussion and if they are disposed of simply to read the papers at home, they will say, "Well, that is all; I don't care about going to hear it read again." But if we get them all here, then we can get up an enthusiasm in the way of discussion.

The President: Is there anything further?

Mr. Yagle: Mr. President, I move that this convention extend a vote of thanks to our retiring President and that he be elected an honorary member of this association.

President-Elect Sadlier: Gentlemen, you have heard the motion. All in favor of the motion signify their assent in the usual way.

(Unanimously carried.)

The President: Gentlemen, I assure you that I appreciate it greatly to be elected an honorary member of such an association as that of the American Foundrymen. Gentlemen, I thank you. I wish to say, however, in this connection, that it is generally understood that this action exempts one from dues.

I will say, however, that I will accede to this part of it, but that the firm I represent will be kept upon the pay-rolls and help the life and sinews of the association.

Mr. Bell: Mr. President, as there seems to be no further business, I move you that we now adjourn.

The President: Think the matter over carefully, gentlemen, before we put this motion. If there is anything that wants to come up before you go.

The Secretary: Mr. President, we have still to hear from Mr. Lannigan, have we not?

The President: Yes, I think Mr. Lannigan might favor us with a few questions before we close. Mr. Lannigan shakes his head, but that does not always imply that he won't do it. Is there a second to that motion?

(Motion seconded and carried.)

Adjourned.

Journal of the American Foundrymen's Association.

VOL. X. JUNE, 1901. PART II.

DISCUSSION ON THE GRADING OF PIG IRON.

Mr. West:—Mr. President, the subject of our "Memorial" is one that no doubt most of the members are familiar with, but there is a probability that there are some who may not be familiar with the origin of this work, and it would be well to make a brief explanation. This memorial is the outcome of a paper that was presented to the Pittsburgh Foundrymen's Association on "Erratic and Systematic Grading of Pig Iron." For some time back there has been a good deal of complaint on account of the absence of system in the matter of grading by analysis. I wish it understood here that this is not by fracture but by analysis. Mr. Church, in his work upon the analysis of pig iron, has enabled us by the data, which he has collected from all parts of this country and some parts of Europe, to show that there are furnace men to-day that call an iron with but a half a per cent. of silicon a No. 1 iron; while, on the other hand, we have other furnace men calling iron that would run four per cent. in silicon a No. 1 also. It takes no stretch of the imagination to realize the confusion this would cause and shows the necessity of having some system so that when we read of a No. 1, 2, or 3, or any number iron, we will be able to form some conception as to what that iron will be when re-melted. We read in the newspapers the prices on No. 1, No. 2, and so on, iron, and it seems very unjust to most furnace men, especially to those that are calling their irons way up in the silicon No. 1, for one of their number to have only a half per cent of silicon called the same thing. This is only one illustration, but I think enough has been said to show the substance of this memorial which you have before you. I will state, however, that copies of my paper read before the Pittsburgh Foundrymen's Association, with the discussions thereon and with a question sheet, were sent out by the committee to all the furnace men and

founders that they thought would be interested in the work, and this memorial contains some of the replies that were received. It is natural to expect that there would be a great deal of difference of opinion regarding what should constitute such a system.

Now, I hold here a discussion on the comments which have been received. I do not think that I have been understood by everybody as to the purport of the table I gave, and for this reason I thought it would help the matter of discussion to present the following:

As a member, independent of my Committee, I wish to comment on the views that are expressed in the Memorial presented to this Convention on grading pig iron by analysis. While more than two-thirds have endorsed my method of grading, I am open to accept that of any one else which may prove more desirable. I am well aware that my method is possibly open to criticism on the ground of too close grading. However, I believe that a few have misunderstood the full import of my proposition.

It was not my idea that because the grades were divided at every quarter of one per cent. in silicon and sulphur ranged from .01 to .10 per cent., as shown by my Table, that any furnacemen should be compelled to fill orders from any one particular grade of iron. I intended that the Number ordered would indicate the grade of iron the consumer desired, and to fill the order the furnaceman could ship any number of grades from which an average could be obtained which corresponds to the grade ordered.

Our foundry is surrounded by blast furnaces and we require probably, as close grading in making our mixtures as any other manufacturer, yet we never think of confining a furnaceman within the full one per cent. of silicon or three hundredths per cent. of sulphur in the iron he furnishes us. If, for example, in following the method of grading I advanced, we desire a No. 4 iron, which has 2.00 to 2.25 silicon and .01 to .05 sulphur, we can accept iron ranging from No. 1 to No. 8, to make an average which will give the grade No. 4 desired, provided we know the grade of every car. There is surely a sufficient margin in this method to permit the furnacemen to fill an order for any particular grade of iron, so far as we are concerned.

There may be furnacemen or salesmen present with whom our firm deals. If there are, they know that we consume at every heat from 60 to 90 tons of pig iron, which would not vary 15 points in silicon or be above .05 in sulphur in our castings. While we obtain such very fine grading in our castings day after day, we never think of confining a furnaceman to shipping the exact grade we desire in our castings. It is not unusual for a furnace to make a special run and stock iron for our needs, and in doing this they may often have many different grades stocked up for our use, but keep in mind the grade of iron we require in our castings and average shipments in such a manner that every pound of iron is used.

When foundrymen, as a rule, produce castings that are to be of some particular softness or hardness, and we know that a change of 25 point silicon and 2 points sulphur can cause them to vary from the best grade in their castings, I fail to perceive the impracticability of any furnaceman accepting orders by the method of numbering the grades from 1 to 10, which I have advanced. In fact, any greater margin would fail to denote the true character of the iron desired and could cause such misunderstanding as to result seriously for both furnaceman and founder.

What is required is a method of numbering that will denote when the character of iron is noticeably changed and not something that is so flexible that any change from one number to another would make a mixture which would vary so greatly as to make castings so unfit for their use that they should be condemned, and this some of the methods advanced would do.

One objection made to my method of grading is that errors in analysis could make a difference of .25 per cent. silicon and .01 in sulphur. Granting this true, as is often the case, and which is a good point to bring up, does this offer any just cause for the consumer not defining as close as he may, the grade he desires to correspond with any range in numbers from 1 to 10, in the method I have presented. If such difference in analysis continue to exist, they can injure the consumer as much as if grades were divided by one per cent. of silicon, instead as low .25 per cent. To my view, this is a factor that should have no weight in deciding the division of grades. However, by the use of the Association's standardized drillings and the adoption of

more uniform methods of making determinations, which is sure to come, there will be little excuse for any great difference in the chemical analysis of one sample of drillings by different chemists.

Mr. Marshall, in commenting on my methods, believes they are too close, and suggests another which presents a sliding scale, and in which he would confine the furnaceman to limits of graphitic and total carbon. It is practical to obtain certain percentages of silicon and sulphur but to confine them to limits of graphitic and total carbon, along with silicon and sulphur limits, is something which I do not believe would meet the endorsement of furnacemen generally. It must be born in mind that whatever we do should be the best to meet universal conditions. My plan confines the grading to percentages of silicon and sulphur only, and wherever anything special is desired in the percentages of the carbons, manganese or phosphorous, let this be designated independent of the silicon and sulphur, which are the variable elements in any iron produced from the same pig metal.

ores, fuel and flux, and which alter the true grade of all cast

Some have objected to my method of limiting sulphur to not exceed .02 in the Number 1 grade shown in my table. Any founder that really requires a No. 1 iron, having silicon 3.00, should not have sulphur exceed the limit I gave. If the sulphur does exceed this, then higher silicon will be necessary, or else the iron will be harder in the castings than would be obtained by using the No. 1 grade as shown in my Table.

There is much more that might be said in reply to the comments on my methods, but I trust this further explanation of my ideas will give a clear understanding of the work before us and that whatever may be adopted will meet the general approval of furnacemen and founders, and this, I believe, may be achieved.

President Jones:—The question is open for discussion, gentlemen.

Mr. Colby:—Mr. President and Gentlemen of the American Foundrymen's Association, what I have to say in answer to Mr. West's paper is based in the Circular Letter which was issued by the Pittsburgh Foundrymen's Association to the Trade, dated Sharpsville, March 27th, and the copy of Mr. West's paper which

accompanied the Circular and which was entitled "The Erratic and Systematic Grading of Pig Iron by Analysis."

The author, Mr. West, first calls attention to what he terms "The present erratic method of grading pig iron" and deduces the graphic statement given by him in Figure No. 1, by selecting the different Silicons quoted for No. 1 Iron in Mr. Seymour R. Church's book entitled "Analysis of Pig Iron" and published in San Francisco in May, 1900.

As Mr. Church's compilation includes analysis of iron used for making Bessemer Steel, Acid Open-Hearth Steel, Basic Open-Hearth Steel, Muck Bar, and in fact every use to which Pig Iron is put, Mr. West's graphic statement does not truly represent the variations in Silicon quoted by Mr. Church for No. 1 Pig Iron, intended solely for *Foundry* purposes.

The speaker does not mean to insinuate, however, that if a compilation of Silicons of No. 1 Foundry Iron (including Charcoal, Coke and Anthracite Iron) were made, that as wide differences as shown in Mr. West's graphic statement would not be found. The speaker thinks, however, that the fallacy of buying Foundry Pig Iron by the present system of grading by fracture could have been *more clearly* brought out by Mr. West if he had shown the variation in chemical composition of different shipments of any one Foundry Iron, produced at a certain furnace and sold to a certain Foundry as "*No. 1 Iron*" at different times covering a period of say two years. This method would have eliminated the many variables due to difference in fuel (Charcoal, Coke and Anthracite); also variables due to the ore and flux, as well as the size of the furnace, size and shape of pigs, etc., all of which exercise an influence on the appearance of the fracture of the iron, and would have clearly proven that even under the most uniform conditions, a "No. 1 Iron" varies in chemical composition.

The present method of grading pig iron by appearance of fracture is based, as is well known by every theoretical and practical man, on the proportion of the Total Carbon present in the graphitic form; a very open grained iron, called by some "No. 1x," contains at least 3.50 per cent. graphite, whereas what is known in the trade as "White" iron contains perhaps not over .50 per cent. graphite.

Some foundrymen realizing that the different makes of "No.

1" iron vary widely in their percentage of Combined Carbon, and wishing a very uniform iron for an important class of Castings, have issued specifications in which the percentage of Combined Carbon is limited. One such specification is as follows:

Combined Carbon, not over, .40 per cent.
Silicon, ... 2.25—2.75 per cent.
Phosphorus, ... .50— .90 per cent.
Manganese, not over,..... .80 per cent.
Sulphur, not over,..... .04 per cent.

The Bethlehem Steel Company, with which the speaker is connected, offered to the customer originating this specification, a machine cast foundry pig iron meeting the above chemical specification except of course the Combined Carbon, and it was represented to the customer, that although the chilling of our iron during the operation of machine casting had converted a larger portion of the Carbon into Combined Carbon than if the same iron had been cast in sand, that as easily machined a casting could be produced by remelting our machine cast iron, containing about 1.00 per cent. of Combined Carbon, as by remelting a sand cast iron containing the percentage of Combined Carbon specified, namely, not over .40 per cent.

The following experiment was immediately undertaken to prove the truth of the above assertion. We had, at the time, one of our Blast Furnaces on Foundry Iron of about 3.00 per cent. Silicon. Arrangements were made for casting one-half of a cast of this Foundry Iron in sand, and the other half was taken in ladels to our casting machine. Equal quantities of drillings from six pigs, selected from different parts of the portion of the cast which had been cast in sand, were taken, and similar drillings were obtained from the portion of the cast which had been taken to the casting machine, and each were carefully analyzed, with the following results:

Cast No. 7602.	Sand Cast.	Machine Cast.
Silicon, ...	3.00 per cent.	2.99 per cent.
Manganese, ...	.95	.95
Phosphorus, ...	.770	.773
Sulphur, ...	.041	.041
Total Carbon, ...	3.460	3.380
Combined Carbon, ...	.250	.920
Graphitic Carbon, ...	3.210	2.460
Tensile Strength, lbs. per sq. inch, ...	15,000	41,000

The high Tensile Strength of the machine cast iron is due almost entirely to the higher percentage of its Combined Carbon.

Some of the sand cast portion of this cast, and some of the machine cast portion, were melted separately in the same cupola, keeping all smelting conditions as nearly uniform as possible, and castings from each melt were made, which were proved by analysis, tensile strength, ability to machine, and appearance of fracture to be as nearly alike as different things, made from the same iron, ever are. The following report on the test ingots, cast with the experimental castings, supports this statement:

	Sand Cast Pig Iron		Machine Cast Pig Iron	
	Ingot 3 ½" square and 1 ½ feet long		Ingot 3 ½" square and 1 ½ feet long.	
	Cast Horizontally.	Cast Vertically	Cast Horizontally	Cast Vertically
Silicon.....	2.93 %	2.91%	2.96 %	2.95 %
Manganese.....	.84	.85	.84	.84
Phosphorus.....	.766	.769	772	.764
Sulphur.....	.071	.064	.077	.071
Total Carbon....	3.400	3.390	3.364	3.357
Combined Carbon	.470	.368	.336	.257
Graphitic Carbon	2.930	3.022	3.028	3.100
Tensile Strength.. lbs. per sq. in ..	18.000	16.300	17.000	17.000
Mark on Ingot...	G2-Fl	G2-El	Gl-Fl	Gl-El

This carefully conducted experiment proves beyond doubt that in two lots of pig iron, similar in chemical composition, including total carbon, that the proportion of the Total Carbon present in the *Combined* state in each lot of pig iron, exercises no influence whatever on the properties of castings made from the two pig irons after remelting.

This experiment is quoted by the speaker in this connection merely as another method of proving the fallacy of judging the grade of a pig iron by its fracture. Here are two (2) pigs, totally different in appearance, and yet coming from the same cast of a furnace, and proved by analysis to be practically similar in chemical composition, save in the proportion of the Total Carbon contained in the Combined form.

In the face of the mass of evidence which has been published in the last few years showing the variations in the chemical composition of iron of similar appearance in fracture, as well as such evidence as is given by these two (2) pigs of entirely similar composition, but differing widely in appearance, it is hard to believe that the day is still very far distant when the present method of selling foundry pig iron by "grade" will be *entirely* abandoned.

Let us now consider the method of grading foundry pig iron suggested by Mr. West, in which he classifies iron in ten grades, Nos. 1-10, according to its Silicon and Sulphur, but without any regard to the percentage of other constituents present. Mr. West states that he favors this method of classification as a result of his extensive experience obtained by closely following the variation in the *hardness* of iron castings, due to the changes in their Silicon and Sulphur contents. The speaker thinks that Mr. West's classification would be a marked improvement over the present method of grading pig iron by fracture, which is based only on the proportion of Total Carbon in the Combined State, but thinks that Mr. West's method still leaves much to be desired, and that before recommending its general adoption, the American Foundrymen's Association should consider whether or not it is possible to devise a more general method of classification, one which takes cognizance of other properties of foundry pig iron, besides the *hardness* imparted to the casting. A classification, in other words, which permits of calling the customers' attention to the *fluidity* of a certain iron, or its freedom from *shrinkage*, or the increased *strength* attending its use.

The speaker is in doubt as to whether Mr. West's classification is to be used for *grading*, according to its hardness, a *certain* brand of pig iron, or whether he proposes to classify the different brands of foundry iron into ten general classes. It hardly seems possible that the latter is the case, as such a classification would bring together under "Grade No. 1," foundry iron in different sections of this country, smelted with Charcoal, Coke or Anthracite, and of so widely varying Phosphorus and Manganese contents, as to produce such difference in physical properties that they would not make castings of similar *hardness* even although they did contain the same Silicon and Sulphur, which warranted them to be classed by Mr. West as "Grade No. 1."

Assuming that Mr. West has only suggested that each brand of pig iron shall be sub-divided into ten grades according to *hardness*, let us consider for a moment whether the adoption of his classification would further the advancement of the application of chemistry to the foundry. Mr. West himself admits that the furnaceman in advertising the different grades of his iron, based on Silicon and Sulphur contents as suggested by Mr. West, should also state the percentage of Phosphorus and Manganese, and in some cases the Total Carbon, that his brand of iron contains. Mr. West also states that in order that foundry pig irons shall be shipped where they will do the work for which they are best suited, that the furnaceman should not only offer his customer a complete chemical analysis of his iron, but also a physical test based on the remelting of the pig iron in a small cupola; that his physical test should give the strength, defelection, contraction, chill and fluidity of the iron as obtained by some practical and standard system of test. If this information, in reference to the chemical and physical properties of foundry iron, is to be furnished, *of what advantage is it to the customer for the furnaceman to call attention to the fact that the customer will notice from the Silicon and Sulphur percentages reported that the iron should be clssified as "Grade No. 3" for instance?*

Mr. West further states that the Phosphorus, Manganese, and Carbon are not touched on in his proposed classification because these ingredients are fairly constant in all brands of iron, made from similar ores, fuels and fluxes, and what slight variations in the proportion of these ingredients do exist, would affect the brand very little.

The speaker heartily wishes that the uniform conditions, assumed by Mr. West to exist, were prevalent in actual practice. The furnaceman's troubles would be greatly decreased if he always had what Mr. West calls "similar ores" to smelt, and if he were always able to obtain "similar fuel and fluxes" with which to smelt them.

In other words, Mr. West's assertion that a brand of foundry iron differs little in composition, other than Silicon and Sulphur, would be found incorrect if the *weekly* shpiments of a particular brand were separately and thoroughly analyzed by the customer.

Furnacemen should be willing to advocate the adoption of Mr. West's grading of their particular brand of pig iron. It would give them a higher price for high Silicon Iron, requiring more fuel to produce, and would at the same time ignore the irregularities in composition, other than Sulphur.

The question for the customer to decide is "*Can this irregularity safely be ignored?*" For evidence of the important influence on the properties of pig iron exercised by other elements than Silicon and Sulphur, attention need only be called to the programme of this convention. Mr. West has presented a paper calling our attention to the influence of Manganese on the properties of foundry iron, and Mr. Rossi has shown us that the strength of iron castings is materially increased by Titanium.

The speaker is confident that those who have most closely applied chemistry to the foundry will bear him out in the assertion that *no one element* can safely be neglected.

Should not, therefore, the American Foundrymen's Association endeavor to ascertain whether a more general classification can be devised before endorsing a classification based only on Silicon and Sulphur ,and which at best will only be temporarily used by the trade if the customer is soon to be furnished with full chemical tests of the pig iron, and will not the adoption of such terms as "Grade No. 1," "Grade No. 2," etc., as suggested by Mr. West, cause confusion in the trade and be often interpreted as referring to the appearance of the fracture of the iron, a meaning which has for so many years been associated with the term "Grade." The speaker suggests the term "Class" instead of the term "Grade."

Perhaps after deliberation, the American Foundrymen's Association will decide that in view of the growing tendency to offer a complete chemical analysis of pig iron, and the desirability of supplementing this information by the physical properties of the iron when remelted, that no classification is necessary. The speaker ventures, however, to call attention in this connection to a classification of the chemical constituents of different brands of pig iron which has been found very convenient by the Sales Department of his Company, and also by those having in charge the records of the tonnage on hand of the different brands of pig iron.

At the works with which the speaker is connected, four (4) kinds of pig iron are made, the surplus of each of which is disposed of in the open market. A *Low Phosphorus Pig Iron*, guaranteed not over .030 per cent. Phosphorus and .030 per cent. Sulphur; a *Bessemer Pig Iron*, containing below .100 per cent. Phosphorus and .05 per cent. Sulphur, and a *High Phosphorus Pig Iron* below 1.00 per cent Phosphorus and .05 per cent. Sulphur, for Basic Open-Hearth purposes and Puddle Mill use. We have also more recently smelted some Foundry Pig Iron.

The confusion of requirements as to the chemical composition of these widely different brands of pig iron, led the speaker to develop what he has termed "A Decimal Classification of Specifications for Bethlehem Steel Company's Pig Iron's." This classification is first based on the *Manganese* contained in the iron. The table is divided vertically into three Manganese divisions, first, a Manganese of .75 per cent. or under; second, a Manganese of .76-1.50 per cent., and third, a Manganese of 1.51-2.25 per cent. Each of these three Manganese ranges, is sub-divided vertically into ranges of Silicon, as follows: .01-.75 per cent.; .76-1.00 per cent.; 1.01-1.25 per cent.; 1.26-1.75 per cent.; 1.76-2.25 per cent.; 2.26-3.25 per cent., etc.

The table is then sub-divided horizontally according to limits of Phosphorus and Sulphur, allowing in each of the three kinds of iron Low Phosphorus, Bessemer, and High Phosphorus —for the variations in Phosphorus and Sulphur unavoidable owing to the differences in the raw materials used.

By this arrangement, four (4) elements are allowed for—Manganese, Silicon, Phosphorus, and Sulphur. It seems to the speaker that this same system might be applied to the Classification of Foundry Pig Irons, and that if desired, the Total Carbon, as well as Manganese, Silicon, Phosphorus, and Sulphur, could be allowed for.

STANDARD METHOD OF SAMPLING PIG IRON.

In order to make any standard method of grading pig iron by analysis of *practical* application it should be accompanied by a recommendation as to a *standard method of sampling* a cast of pig iron, and ranges in composition for the different grades or classes suggested, should not be so narrow as to allow for the

unavoidable variations in composition of the different parts of a cast of pig iron.

I need not lengthen this discussion by quoting from the literature of this subject, for it is well known to you that much evidence has been presented during the last five years showing the variation, for instance, in Silicon and Sulphur between the different pigs in a cast of iron, and in fact between the different portions of the same pig.

I do not mean for a moment to deny the right of the buyer's chemist to ascertain whether the furnaceman has shipped iron within a certain guarantee in chemical composition, but I do claim in the face of the well known variations in composition, existing, that each carload of iron should be taken as a unit, and that the buyer's analysis should be made from drillings from at least a dozen pigs from each car, said drillings to be taken as nearly as possible to represent the entire face of the pig, before he can justly claim that the carload of iron shipped, falls outside the guarantee.

The furnaceman is in a better position to determine the avage composition of his cast of iron than the buyer, no matter how thoroughly the buyer may sample the cast. The furnaceman's sample should consist of small ladle fulls taken from the runner at least four times during the casting, and each ladle full poured into a small ingot, or shotted, by pouring slowly on to a coarse wire gauze resting on a bucket of cold water. If small ingots are used, equal quantities of drillings from each ladle should be taken. If the shotted sample is taken the shot selected should be crushed until the powder entirely passes through an 80 mesh sieve.

In closing this discussion, the speaker recommends that the thanks of the American Foundrymen's Association be given to Mr. West for having taken the initiative in bringing this important matter before this Convention.

The speaker is heartily in favor of grading or rather *classifying* Foundry Pig Iron by analysis, and of doing away entirely with the present method of grading by fracture.

He has taken the liberty of suggesting how Mr. West might have submitted more striking proof of the irregularity of composition of various No. 1 Foundry Irons, and has quoted an experiment recently made at the Works of the Bethlehem Steel

Co. as proof of the wide difference in the appearance of fracture which may be exhibited by Pig Iron of the same composition. He has brought with him specimens from this cast of Iron and the castings made therefrom, and photographs of the fracture, which he would be glad to show to anyone interested.

The speaker thinks that in adopting a classification for Foundry Pig Irons, other elements than Silicon and Sulphur should be considered, and that too narrow a range in classifying the different grades should be avoided, on account of the variations in the chemical composition of a cast.

Finally that in recommending a method of classifying Foundry Pig Irons by chemical analysis, that the American Foundrymen's Association should also recommend a standard method of sampling Foundry Pig Iron, both at the Furnace, and after loading on cars.

Mr. West.—Mr. President, I know it is not generally the rule to allow the reader of a paper to proceed with the first discussion, but as a privilege, if it would be granted, I think I might straighten out considerable matter so that it would make us more speedy in coming to a conclusion, as there has evidently been some misunderstanding of the paper.

President Jones.—I think there will be no objection, Mr. West.

Mr. West.—In Mr. Colby's opening of his discussion he refers to Mr. Church's work, "Analysis of Pig Iron," to show that the reference which has been made to the silicons and sulphurs in a foundry iron, are not exactly to the point. I regret that I have not the work here, but I think that I could show that I made no such error; that wherever I have quoted, as for instance, in reference to the half per cent of silicon being a No. 1 iron, I could show that it was put out simply as a No. 1 charcoal iron. Now, we have a good many founders in this room here who use charcoal iron, and when they call for No. 1 charcoal iron they do not expect to get something that is going to give them a white iron when in a casting three inches thick, which .50 per cent. silicon iron would probably do if the sulphur were anywhere up at all. Mr. Colby seems to have rested under a very serious misapprehension of my paper. I do not think that anybody can show a word or a line in the paper that refers to

the grading by fracture. The whole paper treats of grading by chemical analysis. The title of the paper is "Grading Pig Iron by Chemical Analysis." Fracture is ignored, for the simple reason that I think there has been sufficient advancement at the present day to establish the fact that we cannot tell anything at all about pig iron by its fracture, which fact Mr. Colby has thoroughly demonstrated by the samples that he has passed around here. He has put on the blackboard the analysis of sand cast and machine cast pig and shows us that pig iron from the same cast when some of it is poured into chills and some into sand, that if we remelt these irons under the same conditions we will get practically the same kind of castings. This is a well established fact, for about two years ago I made quite an elaborate series of experiments on that subject and I found in fact that the chilled pig would give you a softer casting than the sand pig would give you. I was somewhat surprised to find the great difference in that line. An analysis of the samples showed us that there had been less silicon burned out of the chill-cast pig and less sulphur absorbed, which you will all understand would mean a softer iron. So that the analyses verified the drill tests which were made of these castings made from remelted sand and cast pig metals. Mr. Colby has verified those experiments very ably here in his discussion to-night. I would like to ask Mr. Colby where he knew the same ores were used and the same fuel and flux, what difference has he found to exist in the manganese and phosphorus? Have you any data at hand, Mr. Colby, that you could give us the benefit of?

Mr. Colby.—I stand up and answer that question as a representative furnace man against a man who is buying our iron, and if I wanted to advertise foundry pig iron I would say there was no difference particularly, but if I wanted to tell the actual truth I would say we find it very hard to find the same ores and the same fuel and the same fluxes for a very long period of run. I think that no foundry iron, if it was submitted to individual analysis of various weekly shipments, would be found to be of the uniformity which the customer in making his silicon and his sulphur determinations, assumes it to be. My point is this simply: that while the variation may be slight, if a manufacturer of foundry iron has a certain definite supply of ores owned by the smelter to draw on, there may not be very much difference, if

the furnace is run regularly, but if he has to go into the open market and make changes in his ore mixture, of which he tells nothing at all to the customer, that it is not safe for the customer to assume that foundry iron of a certain name or of a certain brand is similar in all other constitutents outside of sulphur and silicon. I have seen so many instances of wide variations in the standard makes of foundry pig iron, different shipments of it—I speak now from my experience as a chemist, checking the purchases of foundry iron before we began making it ourselves, that I think it is very unsafe to make the assertion which Mr. West has made, that different smelts from month to month of a certain grade of foundry iron vary only in sulphur and silicon contents.

While I have the pleasure of the attention of the audience I want to say with reference to Mr. West's other criticism, that I was thoroughly cognizant of the fact that he had proved that machine cast and sand cast iron of the same composition made castings of similar ability to machine, but I wanted to take advantage of the opportunity of the attention of this convention to try to put one more nail in the coffin of grading pig iron by fracture, and of buying pig iron by fracture, and of classifying prices of pig iron by fracture. You have nothing to do but to take up The Iron Age or The Iron Trade Review or any other technical paper and you will find foundry pig iron is quoted to-day from $16.50 down to $14, depending upon the fracture, and I would like to see nothing more in the foundry pig iron business than to see that system of grading pig iron according to fracture, and charging more for a No. 1, 2, and 3 iron, abolished, because it does not mean anything at all. I am heartily in sympathy with what Mr. West says, and it was for that reason that I brought forth this proof, which seemed to be of rather carefully conducted experiments, to show the fallacy of grading by fracture. It was nothing in criticism of Mr. West's statements in the paper, for he had made no statements with reference to the grading of iron by fracture, but simply when he stated the fact that it was utterly fallacious to grade pig iron by fracture, I thought I could show it best by eliminating all variants and taking one-half of a cast of iron and casting that in machine and taking the other half and casting it in sand, then taking those two portions, analyzing them separately, as I have shown here, and making them into castings and showing

them to be perfectly uniform in appearance of the fracture of the iron and in tensile strength and in analysis, as the details of my report show. So that portion of my argument was simply to emphasize the fallacy of grading pig iron by fracture and of charging more for a No. 1 iron simply because it was called a No. 1 iron, by fracture. I am heartily in sympathy with what Mr. West has said in reference to the grading of pig iron by its analysis, for it gives the furnace man an opportunity for charging more for what it costs him more to make, namely, a higher silicon iron. But I do not like to see the customer jump at a classification of pig iron based entirely on its silicon and its sulphur contents, which, as a furnace man, I should like to see adopted, but to be perfectly frank, I think it would be a misfortune to adopt it because the uniform condition of ore and fuel and flux does not exist in regular practice.

Mr. West.—Mr. Colby, I would like to ask you another question. You have shown us here that you think it very desirable that the foundryman specify his sulphur, or his phosphorus and manganese, or that it be specified in a grade, and you followed it with showing us that there is great irregularity in producing iron of the same grade and in obtaining the manganese and phosphorus. Now I would ask the question: is it practical for you to send specifications to a furnace man, giving him the silicon and sulphur you want, which would be in any grade, and then also limit him to the exact phosphorus and manganese that you would want? Do you think that a furnace man could give you that, to conform those four elements?

Mr. Colby.—In answering Mr. West's question I might, if representing producers desirous of creating the impression that all foundry irons are uniform in composition, other than silicon and sulphur, answer Mr. West's question by the general statement that with the same ores, and the same fuel and flux, practically no difference would be found in the phosphorus, and but little in the manganese in different shipments of any given foundry pig iron.

Any general statements of this sort, in my opinion, only evade the question, for as a matter of fact it is almost impossible to run a blast furnace for any length of time with exactly the same raw materials. Furthermore, the irregularity in the composition of even the same raw materials often gives appre-

ciable differences in the phosphorus in the pig iron. As to manganese, it varies with the heat of the furnace, and may often be as irregular as the sulphur.

This lack of uniformity in any one foundry pig iron could easily be proven by careful individual analysis of each week's shipments of a certain foundry iron. Even those furnacemen who are fortunate enough to own their own ore mines often go into the open market and purchase a certain lot of ore, offered at an advantageous price, and this temporarily makes a radical change in the ore mixtures. He naturally does this without notifying his customer. There are appreciable differences in phosphorus in different shipments of the fluxes used, whether calcite or dolomite, even when coming from the same quarry. Finally, any one who has made a study of the composition of the ash of cokes will agree with me in the statement that they vary widely in phosphorus. This is true even of the standard Connelsville coke, shipped from different ovens.

It is this knowledge of actual conditions at the blast furnace which has led me to criticise Mr. West's proposed classification for foundry pig iron, based only on variations in silicon and sulphur. It is not comprehensive enough for adoption by this Association as a *general* classification for *all* foundry pig iron, for such classification, *if needed at all,* should allow for the other main chemical constituents, phosphorus, manganese and carbon. I called attention to my "Decimal Classification" at use at our works in this connection, not to recommend its adoption, but simply to show the principle on which it was based, and to state that it had proven of practical value after actual trial, and also to suggest that perhaps a classification for foundry irons could be made up on similar lines which would be better than one based merely on silicon and sulphur.

While I have the floor, I would like to add a word in reference to Mr. West's opening remarks where he states "that I seem to have rested under a very serious misapprehension of his paper." Mr. West is incorrect in stating that I quoted our experiment with machine and sand cast pig iron to refute any statement made by him on grading pig iron by fracture, for, as stated by him, he makes no such statement in any part of his paper. On reading over my remarks Mr. West will find I only referred to our experiment as a very striking example of how

widely different in appearance an iron of the same chemistry might be, and I distinctly stated that this experiment was described in this connection merely as further proof, besides that given by Mr. West, as to the fallacy of judging the grade of pig iron by its fracture.

Mr. West.—I wish to say that I have drawn the table the way I did, because I believe it thoroughly practical, and I wish also to state that I want to support the furnace man as well as the founder, because I am in a position to know his troubles. I believe it impractical to limit the carbons, the phosphorus, and manganese, when we specify the silicon and sulphur. I stated in my paper that it would be well for each founder (as each founder has different conditions to meet in regard to the phosphorus or manganese in his iron) to state what he wants when he calls for a shipment of iron, and then if the furnace man cannot supply it, he can search somewhere else. But it would be, I believe, too confusing and impractical to attempt anything outside of the lines I have given.

Mr. Beckwith.—I think before we pass on with the discussion of this question, the thanks of this convention are due and should be tendered to Mr. Colby for the able way in which he has presented his side of this question to this Association. I think this is a matter upon which this Association may well go slow. I do not think there is anything that we can do to-day that will make us more ridiculous than to set upon any one or two elements in pig iron and attempt to make a grade on that basis. I repeat now what I said at the first meeting at the Franklin Institute in Philadelphia, that if this Association will spend its time to educate the founder to interpret the analysis of iron when he gets it, when it is properly made, the question of grade by fracture will take care of itself. If all of the foundrymen want iron on an analytical specification, which they will make for their own particular needs, the blast-furnaceman won't have any use for grading by fracture. He won't have any customers for that kind of iron. While these discussions are valuable in the way of getting as much light as possible on the subject, I think it is the part of wisdom for the Association to go slow in deciding on taking any extreme ground in the matter. Before I sit down I would move that the thanks of the convention be tendered to Mr. Colby for his able presentation of his side of the case.

Mr. Sadlier.—I second that motion, Mr. President, and also add Mr. West in connection with the vote of thanks. Whereas, I do not agree entirely with the subject of grading iron alone by chemical analysis, it will probably produce a great deal of good results. From all the evidence that has been presented there has only been one line of consideration presented to the convention in the grading of iron by fracture, that is, in the appearance alone of the closeness of the grain. This is not a guide alone to a practical man who proposes to judge iron by the fracture. There are other conditions. One is the color of the iron. The pigs that were presented to us this evening, it is true, showed one a very coarse fracture, the other a very fine fracture. The color, however, is identically the same. Which goes to show in my mind, that the color has something to do with the matter. The strength of the pig where there is indenture, and the pig is not broken off short, has a great deal to do with an estimate of the strength of the iron. There are other conditions to take into consideration when you consider the pig by fracture, which have not been spoken of during the interesting representation of this evening. When chemistry has come upon some positive grounds where the chemists agree among themselves, I, for one, will be very glad and thankful to accept chemical analysis. But until they do, then I say that the American Foundrymen's Association or any other foundrymen, either in America or any other country, would be very foolish to accept chemical analysis as a guide. Until they come together, until they find some positive basis, some positive grounds whereby we can know just exactly what we get. Until that is the case, I venture to say that very nearly the strongest iron, very nearly the weakest iron, very nearly the hardest iron and very nearly the sofest iron, under certain conditions, will show the same chemical analysis. Now then, I believe that iron, when it is melted, it is a good deal like timber that is grown in the forest. I will say that it depends more upon the condition in which it is cooled. That was the condition with a pig that has been presented to us. The gases from the fuel are locked up in that iron and it is cooled in there; crystals in closing up over the iron have held those gases in there, closing up the grain in the iron; consequently you have a close iron, which, when melted again, frees those gases, they get out of there and you have, when you

melt it again, an open iron. It is just as true as that a timber that is grown in a fertile soil has an open and a coarse grain, because it is grown very rapidly. The same thing is true of an iron that is cooled very slowly. You will find there is a very open crystal to it, very open grain, because the gases have got away. You will notice probably that in pouring iron that for days after the iron has been poured you will find heat rising. All that was contained in the iron when the iron was first poured or when it was cast. So I heartily agree with all that is done for advance in the lines of chemistry, but suggest that we be careful.

The Secretary.—I have been trying to get the floor before the last four speakers to do the very thing that Mr. Beckwith has done—propose a vote of thanks to Mr. Colby for the matter that he has presented to us here to-night, and to say that the Bethlehem Steel Company is certainly to be thanked for all the trouble they have taken in making such a large cast to show up this point for us to-night. Now, the committee has reported the resolution given in the memorial, for the simple reason that the committee was a little bit divided; Mr. West is very ambitious in one direction, and I would do the same as you, hold back a little bit. I have never bought a pound of iron on fracture and never will. I specify exactly what composition I want and I get it every time. And I will say that Mr. Colby, Mr. West, and three or four others I can name here, as well as myself, have probably made in all, hundreds of thousands of tons of castings on chemical specifications, and have had perfect success. Now, if this resolution is adopted, that we appoint a committee to look into the matter, the discussion of Mr. Colby will form the basis of a good deal of thought on the subject, and if we could only avoid the making of any specifications by number at all and have chemical specifications only, it would be beautiful, but we cannot yet do so. So we ask you to give us the opportunity to study the matter for a year and report. And now I would also second the resolution presented to give a vote of thanks to Mr. Colby and Mr. West for what they have done for us to-night.

The President.—Gentlemen, it has been moved and seconded that a vote of thanks be tendered to Mr. Colby and the

company that he represents for their labors in presenting this Association with the valuable data that they have; also that a vote of thanks be tendered Mr. West for the paper which he has read this evening. (Motion put and carried).

Mr. Brown.—I only desire, Mr. President, to call attention to the fact that the proposition before us by this resolution was that a committee should be appointed to report in a year from now. I did not understand that the committee asked the American Foundrymen's Association to commit themselves to anything beyond an investigation of this subject. It seems to me as though if the committee could be appointed consisting of two sharps in the chemistry line and two equal sharps in the furnaceman's line, that we ordinary foundrymen, in a year from now, would be able to get some grain of comfort out of it. It would be like the Kilkenney-cat fight, in which the most of us would stand by in great deal of pleasant appreciation and possibly at the end of the year we would know something about chemical analysis and fracture. And if in the meantime they would publish the results of their little seances through the Foundrymen's Journal, in a year from now, if the proposition came up then to adopt any standard of classification, why, we would know something about it. I am free to admit that I know very little about this paper at the present time. I should be unwilling individually to do anything that would commit this Association to any classification, whatever, at the present time. It seems as though this resolution, which reads that in view of the urgent demand for a modern system of grading pig iron a committee be appointed to look into this question and report thereon at the next convention, is a very interesting proposition, one that we can adopt in five minutes and end this discussion, which is interesting but consumes a long time.

Mr. West.—Mr. President, I would like to suggest a word: that in the formation of this committee Mr. Colby be added, if he will serve with us. He would make a valuable member indeed.

The Secretary.—Mr. President, the Pittsburgh Foundrymen's Association, through this committee, present a resolution for discussion, either to be adopted or declined. I suppose the resolution is really on the table and to be acted upon.

The President.—Then action on that resolution would be

in order. Gentlemen, you have heard the resolution. What is your pleasure in regard to it? The understanding that the chair has of the matter, is that if the resolution is adopted, that a committee be appointed to look into the matter of grading by analysis and report at the next convention.

Mr. Bell.—Mr. Chairman, I do not understand the present status as some of you seem to. The question was presented here from the Pittsburgh Foundrymen's Association asking this Association to take this matter up and to appoint a committee. Now, until there is a motion made by a member of this Association to appoint a committee, there is no such resolution before the house. The memorial comes up asking the convention to do so, but the question itself is not before the Association until it has been moved and seconded by some members of this Association. No resolution can come up from any other body that it is the duty of this Association to take charge of, except by the action of its own members, that is the way I understand the parliamentary rule.

The Secretary.—Mr. President, that point is well raised, but Mr. Bell, if you will notice, it is signed by Mr. West and by myself, and we present that resolution for adoption or otherwise; that is, Mr. West presents the resolution and I second it, so that it is really before the house. (Motion put and carried).

Mr. Colby.—Although I realize that the long discussion on this important question has extended this meeting to a late hour, I would like the privilege, Mr. President, of a moment in which to express my appreciation of the vote of thanks with which this convention has, on motion, extended to me and the company I represent, for the pains taken in preparing the discussion of Mr. West's paper, which I have presented this evening.

May I add one thought in answer to Mr. Sadlier, who, although acknowledging the value of chemistry, attaches more weight to the appearance of the fracture of the iron, including the size of the grain and the color and strength of the iron when broken.

The application of chemistry to steel metallurgy has resulted in such rapid advances that I am anxious to see chemistry become an equally important factor in foundry practice. I think the present prejudice against the purchase of foundry

irons entirely on analysis, is due largely to the inaccurate chemical analyses quoted in the trade. These inaccuracies are due either to careless analytical work, or more often to poor sampling.

A founder endeavors honestly to apply chemistry to the selection of his pig irons, and to the mixing of his irons in the cupola, but becomes discouraged because he can see no practical benefits, and so returns to selecting his iron by the appearance of its fracture. I venture to say that in the majority of cases his failure is not so much due to his lack of perseverance as to the fact that the samples analyzed did not properly represent the casts of iron he was using, and perhaps also to the fact that he has called in that most expensive of luxuries to an iron works, a *cheap* chemist.

A steel works chemist, and an analytical machine who turns out so many analyses a day, are two different personalities.

Let the foundryman pay enough to secure a good chemist, then give him entire charge of the sampling and give him access to the foundry records, and I venture to say that at our next convention, much testimony will be given as to the practical value resulting from the application of chemistry to the selection and mixing of foundry pig irons.

Mr. Putnam.—(*The Tradesman, April 15*). Mr. Thos. D. West's paper on this topic is a timely contribution to the discussion of a question, the solution of which seems doomed to extremely vexatious delay.

Perhaps, however, this delay is nothing more than ought to be expected, from the nature and magnitude of the matter. I confess that my own views have undergone some modification since the newspaper discussion began, some years ago. The fact is that foundrymen engaged in the manufacture of widely different classes of work are pretty sure to differ materially in their opinions upon the subject of grading. Many foundries can use irons of wide range of analysis without much detriment, while others are, of necessity, very exacting. It takes a good deal of discussion and controversy to bring the operators of these two classes of foundries to understand one another, and to appreciate the differing circumstances affecting each.

One foundryman is particular as to manganese, another as to sulphur, another as to silicon, etc.

The fact is that the whole chemistry of cast iron is a deep mystery to most of us; and, judging from the various published opinions of the experts, there is more or less of fog in these quarters also. However, Mr. West's ideas, are such as commend themselves to reason, it seems to me. We know Mr. West to be a thoroughly practical foundryman, and one of the most indefatigable investigators of metallurgy, to start with; and the man who knows nothing about the chemistry of iron, from original research, must agree that if a No. 1 iron contain 2.75 silicon and .02 sulphur, then an iron which contains but 1.50 silicon and .05 of sulphur is not No. 1 iron.

It needs no argument whatever, to show that Mr. West is right. What is needed is a universal standard for the grading of pig iron at the blast furnace. Instead of this, we get, say, from the south, a No. 2 soft coke iron with 2.75 silicon, and from the Lake Superior region a No. 1 foundry with 1.50 silicon. Not only this, but different furnaces in the same section employ widely different standards and arbitrary rules, which speak no intelligible language to the buyer.

The heavy demand for pig iron during the last few years has made progress towards a more perfect system of grading almost impossible. During the boom anything in the shape of pig iron would sell readily at an enormous profit; and the trade has not yet got over the demoralization that resulted.

It will be a good thing if Mr. West and others who have the ability shall succeed in educating foundrymen generally to the point that will lead them to make an effective demand for better service by the time the next pinch comes, when the furnaces will be in a situation to induce them to listen to the reasonable demands of customers.

Mr. Vannier.—(*The Iron Trade Review, June 27*). The following objections would seem to present themselves to Mr. West's proposals for grading pig iron: In practice great difficulty would arise in checking the sulphur analysis within the narrow limits laid down by Mr. West. Rather than specify the sulphur between certain limits for certain grades, it will be found more practicable to specify the maximum limit for each different grade. My ideas as to a suitable method of grading pig iron by analysis would be somewhat after the following:

First, make special specifications for ferro-silicon, or so-

called silvery iron, limiting the minimum in silicon to say 4 per cent., sulphur not to exceed .035. Now, inasmuch as some pig iron of this character is made with sulphur over .035. it will be necessary to establish an off grade, giving the silicon the same specifications, but allowing sulphur to be over .035.

It will be necessary to give separate specifications for charcoal and coke irons, as the charcoal irons are almost always lower in sulphur and silicon (with same carbon contents) than the coke irons.

No. 1 coke iron is to be graded according to the per cent. of silicon and sulphur, the silicon to range from a minimum of 3 per cent. to a maximum of 4 per cent., sulphur not over .035. Now, inasmuch as pig iron with silicon ranging from 3 to 4 per cent. is frequently made with sulphur over .035, provision should be made for this grade of iron, and I would propose to call it No. 1 X, or off No. 1. Presumably the furnace men would prefer to call it No. 1 X. Regarding the matter of carbon, which we know has very much to do with the properties which the pig iron imparts to castings, it will only be necessary to say with No. 1 pig iron that the fracture shall be gray, and that in the No. 1 the grain shall be open. This will serve as a protection for the foundryman who has no chemist, as unless the foundryman has an analysis made of each carload of pig iron, he will have no means of judging, except by the furnace analysis, whether he is getting strictly No. 1 or off No. 1. I figure that the increase in sulphur will affect the grain and in this way reveal itself.

With the No. 1 foundry iron the matter of color and size of grain has much less influence than with the higher grades lower in silicon and higher in sulphur; still, it is well to take into account the matter of fracture as well as analysis, even with the No. 1 iron.

For No. 2 coke iron, I would suggest in a general way that the specifications call for silicon from 2 to 3 per cent., sulphur not over .05, fracture of pig iron to be gray and open in grain. No. 2 X, or off No. 2, to have the same silicon limits, but with sulphur over .05; the fracture my show a close grain iron, but the color must be gray.

No. 3 coke iron shall have silicon between the limits of 1½ and 2 per cent., sulphur not over .05. No. 3 X, or off No. 3, same silicon as No. 3 straight, but sulphur over .05. Both

grades of No. 3 must show a gray fracture in the pig.

No. 4 shall have silicon between the limits of 1 and 1½ per cent., sulphur not over .075. No. 4 X, or off No. 4, same silicon as No. 4, with sulphur over .075. The fracture of No. 4 straight must be gray and of No. 4 X it may be either gray or mottled.

No. 5 pig iron shall be between the limits of ½ to 1 per cent. in silicon, and sulphur not to exceed .10. The fracture may be gray, mottled or white. No. 5 X, or off No. 5, same silicon as No. 5, with sulphur over .10, the fracture may be either gray, mottled or white.

No. 6 shall include all iron with silicon under ½ per cent., with sulphur not to exceed .10. No. 6 X, or off No. 6, same silicon as No. 6, but with sulphur over .10. The fracture of iron of this character will usually be mottled or white, although this is not always the case, and therefore, specifications for grade or fracture may cover gray, mottled or white, as required.

It may seem in the above that I have been too liberal in the matter of sulphur limits; however, it has been my experience that in the majority of cases when I come to investigate the matter of sulphur contents it is often found to be higher rather than lower than the analysis furnished; in other words, many chemists do not get all the sulphur in the pig iron, and for this reason, it would be a good thing if a standard method of sulphur analysis could be used in working on pig iron. There are some very good and reliable methods; there are others which are not to be relied upon, but owing to the ease with which they are carried out are much in use.

When a coke pig iron is reported with sulphur .01, it is safe in the majority of cases to have another analysis made by a different chemist, as such low sulphur in coke pig iron I do not believe to be in accordance with actual conditions except in isolated cases.

The sulphur in foundry iron is not always accountable for the bad results attributed to it; in other words, an infinitely small amount of sulphur is frequently held responsible for defects with which the sulphur in the pig iron has had nothing whatever to do. When it is remembered that from one-third to one-half of the sulphur in the coke goes into the mixture during the process of melting, it would seem that more attention should be given to the important subject of sulphur in coke than it usually gets.

Regarding the necessity of taking into account the fracture in grading pig iron, it must be remembered that the color of the fracture and the size of the grain, other things being equal, that is to say, with same silicon, sulphur, etc., depend on the amount of total carbon, and inasmuch as the amount of total carbon in the pig iron cuts a very important figure in its adaptability to different classes of work, unless analyses are made and furnished with each carload of pig iron showing the per cent. of the total carbon, it would seem to be necessary to take into account the fracture, and for this reason, I have included the matter of fracture together with the chemical specifications for sulphur and silicon.

The above plan is not supposed to be perfect by any means, and it is subject to criticism; however, it may serve as a basis to settle the important subject under discussion, of a practicable way of grading pig iron so that the method will be satisfactory to the seller as well as the buyer. In this matter it will not do to be too technical nor to specify impossibilities; the subject is a broad one and must be treated in a broad, liberal way.

The above specifications are intended for grading pig iron cast in sand molds. For sandless pig iron the same limits will answer for silicon and sulphur, but unless the total carbon is furnished also, the foundryman will have no means of judging the carbon contents, as the fracture reveals but little in sandless pig iron, except as between white iron and gray. Regarding maximum limits for sulphur in the off or X grades given above, this would seem to be best settled by special agreement between the seller and the buyer.

Mr. Umberger:—(*The Iron Trade Review, July 11*). I would say that in my opinion the only proper manner of selling and determining quality and character is by full analysis, irrespective of grade, fracture or number. The analysis will give the true character of the iron and its adaptability for different requirements. Making and handling pig iron by old methods must give way to modern scientific principles. No doubt chemical determinations will be Greek to many users of pig iron, but if they desire to remain in the procession they will have to adapt themselves to conditions or continue in the background.

Mr. Marshall:—(*The Iron Trade Review, June 20*). Mr. West gives a wrong impression of my ideas when he speaks of

my system as being a "sliding scale which confines the furnacemen to limits of graphitic and total carbon." The paper as I wrote it was entitled, "A System of Grading Pig Iron by Analysis Based on a Sliding Scale for Silicon and Sulphur and a Minimum Limit for Carbon." The scale depends on a regular increase in sulphur content for every increase of silicon, as published, and is presented so as to have fewer grades for selling agents and leaving it to the foundryman to ask for just the particular analysis he desires under the head of grade bought. If the foundryman is to work satisfactorily with the furnaceman on the manner of grading he should be in a position to ask for what he wants or else rely on the furnaceman's honesty of purpose in sending him the required grade with the analysis of same. The scale I present is distinctly a "Silicon and Sulphur One" and there was only a limit placed as to the minimum amount of carbon. This may have been too high for every one, but I hardly think so, and anyway it is a point easily remedied when all the "ideas" are in.

In the publication of my "Sliding Scale" I noticed two mistakes from the original paper sent Mr. West. The word "silicon" is left out of the title which should have read, "Sliding Scale for Silicon and Sulphur, etc.;" also under head of "grey forge" the minimum amount of graphitic carbon was published .075, which should have been 1.25. This whole scheme, I think, presents an easy way of grading, as it allows for few grades and still covers all the requirements, provided both foundryman and furnaceman work on chemical lines, and stick to them.

Under the head of "softeners" I placed silicons over 3.00 with sulphur under .050, and did not elaborate on the scale as it would work on the same general idea as other grades. My reasons for putting carbon in the scale was that it is a most important element and graphitic carbon along with low sulphur content in pig iron is absolutely necessary for a good soft iron. The way it was included in the scale would not hamper it at all, as only the minimum amount required was entered and would be a good guide as to softness or hardness of iron.

DISCUSSION OF MR. ROSSI'S PAPER ON THE INFLUENCE OF TITANIUM ON CAST IRON.

The President:—Gentlemen, you have heard the very able paper of Mr. Rossi. The matter is now open for discussion and

I would be pleased to hear from Mr. Colby as I understand he has given this matter considerable thought.

Mr. Colby:—Mr. President and Gentlemen. To those of us who have had the pleasure of making a special study of the addition of rare elements to iron and steel, Mr. Rossi's experiments with titanium, which he has conducted for many years, are not new. In 1893 he presented a paper before the American Institute of Mining Engineers on "Smelting Titaniferous Iron Ores," and last May he read a paper before the American Society of Mechanical Engineers, at Milwaukee, giving the result of his experiments on the addition of titanium to steel, as well as to cast iron. The Bethlehem Steel Company, with which I am connected as metallurgist, has perhaps made a more thorough study than any other one company in America, on the results obtained by adding some of the rarer elements to steel. The envied reputation that some of our specialties have won, and the high physical qualities of our nickel steel forgings, amply justifies the study of the effects of adding rare elements to iron and steel.

I happen to be in a position to support Mr. Rossi's statement in reference to the large amount of titanium in the Adirondack region. There are mountains of it there—in the form of titaniferous iron ore, a rich magnetite very low in phosphorus and silica.

In 1893 he showed us how these ores could be smelted in a small blast furnace, by the formation of multiple titanates in the slag, and in his present paper he tells us that these titaniferous ores can be reduced in an electric furnace to form an alloy containing 5 to 7 per cent. Carbon and 9 to 24 per cent. Titanium. He tells us that these titaniferous alloys are light, becoming more so as the percentage of titanium raises, as the specific gravity of this element is only about 5, whereas cast iron is at least 7; also that as the titanium percentage increases, the alloys become more infusible. This lightness and infusibility are objections, and both tend, unless great care is used, to prevent uniform distribution of the titanium throughout the iron or steel to which it is added.

Mr. Rossi gives us no positive data as to the cost of his titanium alloy, and until this important point is definitely determined, he cannot hope to substitute it for alloys now being

used to strengthen cast iron, for before many can be induced to try a new alloy for experimental purposes, they must have a reasonable assurance that they can, by the use of the new alloy, obtain at least equal advantages for a less cost.

His alloy was recently offered to our Company for addition to steel and claims made for it that it would give qualities superior to those obtained by other elements, notably nickel, and it is in reference to these claims, rather than to discuss the effects of titanium on cast iron, that I rise in this discussion.

I hold in my hand two photographs, the one of an exhibit of 30 caliber Winchester rifle barrels, and one showing a section of a hollow marine engine shaft and also a 5-inch U. S. Army gun tube, all of which forgings were made of Bethlehem Nickel Steel. The exhibit was prepared for the Glasgow Exhibition.

The first photograph shows an octagonal rifle barrel 26 inches long and a tapered rifle barrel 28 inches long. You will notice that a second one of each of these two bored and finished rifle barrels has been bent into a closed "U" without showing any signs of fracture. This bending was done cold and forms a very severe test for metal of such high tensile strength.

The photograph also includes the following table showing what remarkable physical qualities may be obtained by careful heat treatment of our Nickel Steel. Notice particularly the very high elastic limit. In ordinary rolled steel containing no Nickel, you are aware that the elastic limit is usually not over 50 per cent. of the tensile strength, whereas with this Nickel Steel the elastic limit amounts to 85 per cent. of the tensile strength. In steel of such high tensile strength as this the high elongations and contractions of area (a sure index of the quality of the metal) are also worthy of remark.

Tensile Strength, lbs. per sq. in.	Elastic Limit lbs. per sq. in.	Elongation, per cent in 2 in.	Contraction of Area, per cent
115,100	99,820	23.00	64 00
114,080	97,780	23.00	64.95
114,590	99,820	23.00	65.45
116,620	96,770	22.50	62.05
116,120	97,780	23.00	64.00
114,590	98 800	24.00	62 53

The second photograph shows on the left a section cut from a Nickel Steel marine engine shaft for a U. S. Navy Torpedo Boat Destroyer. The test ring with only ½-inch walls was pressed into an ellipse with the major axis three (3) times the minor axis.

On the right of this second photograph is shown a section cut from a U. S. Army gun tube, 5-inch caliber. The section cut from the end of this tube was turned up into a ring with ½-inch walls, and was pressed into an ellipse until the major axis 2 inches gauged length, and the other the Standard U. S. Army specimen of .564 inches diameter and 4 inches gauged length, are as follows:
was twice the minor axis. This deformation produced no signs of fracture in either case.

The physical properties of the steel, as determined on two turned specimens, cut from the finished and treated forging, one the Standard U. S. Navy specimen of .500 inches diameter and

Nickel Steel Marine Engine Shaft.

Size of Test Specimen.	Tensile Strength, lbs. per sq in.	Elastic Limit, lbs. per sq. in	Elongation per cent. in	Contraction of Area, per cent
U S. Navy .500 " x 2"	102 370	58,240	25 % in 2"	58.0
U. S. Army .564 " x 4"	100,000	68,000	20 % in 4"	59.7

Nickel Steel U. S Army Gun Tube.

Size of Test Specimen.	Tensile Strength, lbs. per sq. in.	Elastic Limit, lbs per sq in	Elongation per cent. in	Contraction of Area. per cent.
U. S. Navy .497" x 2"	112,490	72,610	25 % in 2"	57.4
U. S. Army .564" x 4"	112,000	72,800	20 % in 4"	58.8

I could easily duplicate instances like the above showing the high physical qualities obtained by adding Nickel to steel, and which qualities have not as yet been equalled by the addition of Titanium to steel.

One great advantage in the use of nickel as an alloy in iron or steel is that its physical qualities are so nearly allied to iron that it naturally forms a thorough and perfect alloy with it, and hence does not tend to segregate from the iron even in large masses. The following statement compares some of the physical properties of Iron and Nickel:

	Iron.	Nickel.
Specific Gravity, ...	7.77	8.82
Atomic Weight, ...	56	58.8
Atomic Volume, ...	6.37	6.37
Specific Heat, ...	.114	.108

DISCUSSION OF MR. WEST'S PAPER ON MANGANESE IN CAST IRON.

Mr. Colby:—Mr. President and Gentlemen, I have not the pleasure of a personal acquaintance with Mr. West, the author of the paper just read, although I have read many of his writings. I am sorry that we did not know at Bethlehem that he was conducting a series of experiments on the influence of manganese on pig iron, as we would have offered him some of our own high manganese foundry pig iron for his experiments. We, in Bethlehem, have been only occasional producers of foundry iron, on one of our furnaces, and usually for our own use, and, as our foundryman who is present at this meeting will tell you, we have made a wide variety of iron castings, varying also greatly in weight, from a few pounds to as high as 180 tons, the latter for our fluid compression plant and large forging presses. We have long been cognizant of the advantages of manganese in foundry pig iron. We have found, as Mr. West says, that it adds strength as of course it raises the combined carbon. It also adds fluidity to the iron and we think increases the density, as it removes the gases producing blow-holes, and also makes a more uniform grain, due to a more uniform distribution of the graphite, so that in machining we obtain the advantage of working on a much more uniform grained material. I am glad to see that Mr. West calls attention to the danger of introducing manganese into foundry pig iron, by means of *an*

alloy. On the bottom of Page 84 he states "in adding manganese to molten metal, the iron should never be dull, but as hot as practicable, in order that all the manganese may be melted in such a manner that a homogenous mixture may result. Where iron is dull, a fracture may often show little bright spots or grains of manganese alloy that did not melt or mix properly with the iron. In such cases more harm is done than good."

This difficulty of thoroughly mixing the manganese, when added as an alloy, led us to add manganese in our blast furnace, and we have produced a foundry iron varying from one to one and one-half per cent. manganese and obtained very much better results, much more uniform results than when adding manganese either as ferro-manganese or spiegeleisen to the cupola, ladel or in the open-hearth furnace, in making gun metal. We should like to give the foundrymen present, the opportunity of trying this high manganese foundry pig iron. I appreciate that the floor of this Convention is not a proper place to sell pig iron, but perhaps it is in order for me to offer to practically give it away; I should be very glad to have you correspond with our people with reference to trying small lots of this high manganese foundry pig iron at an introductory price, in order to give you the opportunity of proving to your own satisfaction, the advantages we claim for our high manganese, high silicon foundry iron.

Note by the Secretary:—Mr. West's paper on the effects of variations in manganese on different grades of iron was delayed for various reasons, to an extent which made proper proof reading impossible, inasmuch as the important contribution was wanted for presentation at the Convention. Our members are therefore asked to make the following corrections:

Page 75.—14 lines from botton B should read V.

Page 75.—11 lines from bottom B should read E.

Page 75.—2 lines from bottom Z should read U.

Page 76.—Heat No. 11. Cupola should read ladle.

Page 76.—Heat No. 26. Bessemer pig should read Mn. in Cupola.

Page 76.—Heat No. 24, column 7—.328 should read .428.

Page 76.—Heat No. 30, column 6—.230 should read .830.

Page 77.—Table 1 should read Table 2.

Page 77.—Heat No. 10, column 15—3.25 should read 3.35.

Page 78.—End of first paragraph add "shown at W. Fig. 4."

Page 83.—Line 24, cut out "proprietor....Cleveland, O."

Page 84.—Line 2, Table 1 should read Table 2.

Page 85.—6 lines from bottom, weakened should read weaker.

DISCUSSION ON THE "MOLDER QUESTION."

In connection with the paper on "*The Problem of the Molder*" by Mr. Sadlier and "*The Management of the Foundry*" by Mr. Gilmour.

Mr. E. H. Walker.—Mr. President, I have only had an opportunity of looking over this paper during the reading so that I have no matter of great importance to present in the way of discussion. Of course, if we take a broad and liberal view of the foundry business we shall devote part of our lives and capital and certain space in our shops to training molders, but I do not think that is what we are in the foundry business for. While it may be a very benevolent idea to train mechanics it seems to me that most of us are more anxious than anything else to get our molding done at a low cost, as low as is consistent with good work. It seems to me that a discussion might follow this paper which should include some interchange of ideas, not on a point as to how we are going to educate molders, for we all know how to do that if we want to, but it seems to me regarding the relation between the apprentice and the cheap molder, the laborer molder, the man who comes into your shop and through repetition work is taught to make one or two pieces and never learns anything else. I do not call him an apprentice. It seems to me we sometimes talk to each other about how many apprentices we are using when the apprentices that we have are really cheap workmen, to whom we are giving no instruction at all. I do not know that there is any reason why we should, as long as they do repetition work to our satisfaction. Of course they cannot do the highest class of work that is made, and in a jobbing foundry possibly all the molders ought to be skilled men, but in most of the foundries where the work is repeated over and over again, there is a field for the cheap molder, who is not an apprentice and who never will

be an expert molder. I understand that in the machine shops of the country this matter has been fairly well worked out and that it is rare to find a boy who can learn under the present system all the branches of the machinist's trade. The business is getting more and more specialized and a boy learns to run one tool or he learns one particular process. It seems to me that it is logical to suppose that that same condition will come about eventually in the foundry business, particularly in foundries where repetition work is done. Now, as I say, I have no particular arguments or ideas to advance at this time, but if we could get the men who are here conferring as to the difference between a cheap molder and an apprentice, and whether the cheap molder has a place, such a discussion might be of value to all of us.

Mr. Sadlier.—Mr. President and Gentlemen, in reference to what Mr. Walker has just said, in my short paper I did not set out to consider the specialist, though the specialist will invariably fall into and attempt jobbing molding. As every founder knows, there is a line of work in all jobbing foundries or in all machinery foundries that is continually changing. You can't help it; it is bound to be so in all large shops where there is a large line of patterns going through the foundry and I believe that the molders of America, in many cases, have degenerated. I believe that they are not what they have been. I was considered at the age of 18 a fair journeyman, a journeyman of sufficient ability to get 20 cents a day more than any journeyman in the shop. After I was considered that I just took 16 years to perfect myself as a molder. I went into what I considered the best shops in the country to learn the business, and I have given the question of the education of molders considerable attention.

I say that at all times there will be a certain number of first-class molders required, men that have got to be general molders, and I feel aggravated often times when I make an effort to educate my apprentices and get along to their second or third year, to have other foundrymen come in and offer them even bigger wages probably than they are paying many of the other men to take them out of the shop. It is a deplorable condition, much like stealing. Many of the boys who have served their time under me have actually got into positions as foremen of foundries, because I have always given great attention to educate the ap-

prentice. It is a business, as I stated in the paper, that has got to be learned by yourself. There is no literature, there is nothing from any outside source that will make a molder out of a man; he has got to learn it himself. He has got to get it right into his composition. He has got to learn every day, it is part of the man, the trade, and so the quicker and the more thorough an apprentice is educated, the sooner he is fit to become a proficient molder. You get a better class of men by doing this, by making a thorough molder out of the material as nearly as you can, and by doing this we help each other. If we do not, it strikes me the time is coming when, owing to the condition of the molders as a class, the need of good ones will be badly felt by the founders of America. We know, or at least I know, that it is true. I have watched it very carefully. Now I see to-day that in the ordinary jobbing shops, where progress has been made in many other directions in increasing the work, etc., that there has not been one iota of improvement or increase in the regular jobbing shops of this country, at least not any that I have seen. There have been a few machines applied in them, but take the man himself, I believe he has gone down, gone back, from the days when I first knew him, simply because there are so many of those that are made specialists, that the result is a class of men inferior to those who go through a regular apprenticeship.

Mr. Groves.—Mr. President, I would like just to support what my friend Mr. Sadlier has said. Some few years ago I had an opportunity of watching our friend Mr. Sadlier performing the very duty that he has just now referred to, and only five days ago I was walking through one of the most important foundries in the country and I saw a boy in a pit working upon one of the most complicated and complex castings that it is possible for a molder to deal with. That boy was working with a man 50 years of age; the man was known to be one of the best practical jobbing molders in the United States to-day, and I talked to the foreman, I said "I know that boy," and in a few minutes the conversation came up that the boy was one who was trained by Mr. Sadlier when he was working on the floor of the famous Walker Manufacturing Company. That boy to-day is just over 20 and yet the foreman said to me that he had not a better molder in the plant than him, and yet I know that in the shop I am now speaking of there are at least, three or four first-class molders.

If ever there was a shop that I remember in my experience where men took an interest in the lads and the man that ran the place took an interest in the boys, it was that shop, and to-day the men who were raised under Mr. Sadlier have got ahead of all the men who were around the shop at that time. He is now a manufacturer himself, and the shop I am now speaking of is in charge of two men who are doing some of the most important work in this country to-day, both of them were working in the very shop in which Mr. Sadlier worked. I certainly say, with Mr. Sadlier, that it will pay any founder to-day who will take an interest in the boys and give them a chance to do the best work and to encourage their molders.

Mr. West.—I think our association should be congratulated upon our secretary being so successful in securing papers such as those from both Mr. Gilmour and Mr. Sadlier. They are practical men, men who have had the hard knocks, and the more that this association can get papers from such men, the more incentive there will be for those seeking information to come with us. There are several points in Mr. Gilmour's paper that attract my attention and please me very much. They are somewhat in the line of Mr. Sadlier's paper and I thought I would delay any discussion of Mr. Sadlier's paper and make the points on the two at one time. Mr. Gilmour seems to be in harmony with myself in that in time the foreman will understand chemistry, that he will acknowledge that it is as essential for him to understand it as to understand anything else about a foundry, and I am always pleased to see any forward step in that direction. Another matter, as to the education of the apprentice. There is a great difference of views on the subject. Some seem to hold that because it is a dirty business and hard labor, that there is no encouragement for a young man of the present day to become engaged in the occupation of foundryman. I believe that there are ways and means which could be adopted that would remove such impressions and make our trade more attractive, so that we could draw in brighter minds. It is certainly not very encouraging now for a boy when he just starts in the shop and finds that all he has got to do is to move along, he may go along with the best man in the shop, and pound sand, and shovel and use a trowel now and then, and go on in that sort of way; he simply is an imitator; he is simply following what

he is shown. But let us go with that boy and teach him that there are underlying principles there, that there are principles involved in the work that he is doing that are more important than those of any other trade in existence at the present day. I think we will then be doing something that will cause that boy to become much more interested in his work. At the present time we have no such methods, only just simply the foreman himself who may take an interest in the boy. Then, as a rule, the boy is discouraged by shop talk of the men around, he is told that he is trying to assume work that is beyond his reach, or something of that kind. I have suggested in a former article already that I thought it was practicable for us to have a foundry where we could educate molders, where while learning the manual work, we could teach them the principles and the higher science of the trade. Such an institution, in my estimation, is badly needed at the present time. We have men, our foremen are selected by our choice from the sand, and they get advancement simply by their own efforts. Some have to labor against great disadvantages, and those who have come up should be encouraged for their efforts. I do believe that it is particular for us, in the making of foundry foremen and managers to make them men such as the financial man of our industries, for at the present day we have a condition that is different from what existed 30 years ago. I believe it is safe to say to-day that at least over two-thirds who have got their money in the foundry, are not really practical foundrymen, whereas thirty years ago it would be something odd to find a man that dared to venture into the foundry business if he did not understand it and was not able to go in and kick any man out of his shop who was doing bad work there, and do it himself. We men in the business want companions in our men. They want somebody who can go with them, somebody whom they can associate with and have confidence in, and it is pretty hard to go in a shop and pick out such a class of men to-day. I believe it is possible for us to have a school where we can go to work and educate the molder and also educate the true superintendent, the man many of us would be glad to obtain and be glad also to give him that higher salary that some seem to complain about. There is a great deal of complaint about not getting sufficient salary. I believe a lot of men get a great deal more than they are worth. I would like

to see an institution, a large shop, where all branches of work could be made and where, a few evenings a week, that same institution would have teachers to instruct the student in the higher science strictly pertaining to his business, so that there would not be so much time lost in his study work. One trouble the present day is we are studying and wasting the best part of our lives on things we cannot use, but in the manner suggested we would be applying ourselves to study directly, and in a few years we would be of benefit to ourselves and the world at large. And I was going to make a motion to such effect: that there might be a committee appointed to consider plans of approaching parties who might take some interest in such a work, but I will not do so at the present time. I will let the thought slumber and probably to-morrow may bring it up again. But I would like the members to think the matter over and to get in a position so that they could express themselves as to the practicability of our having a committee, or taking some measures that might finally result in our having some such institution as I have described.

Mr. Lanigan.—Mr. Chairman, I would like to ask Mr. West a simple question, supposing this school that he is dreaming of, year in and year out, should ever be established, where molders might be educated, supposing that he had a bright, intelligent boy in his own shop that knew every corner in the shop and everything in relation to his particular business; now, would he, as a practical, wise business man, go to the school to get a foreman or take the boy in his own employ?

Mr. West.—Mr. President, I should certainly take the boy in my own employ, if that boy had been brought up in the way I had pointed him to have gone, but there are lots in this country that want more than that one boy, and I think it is the general consensus of opinion that the molder has degenerated, that is, what we call the molder. I fully agree with Mr. Walker over there that we want cheap men, but we are pretty sure of getting enough of that kind. There is a field for the cheap man and there is a field for the good man, but I do not think, under our general way of going along, that we are going to make enough of the good ones.

Mr. McPhee.—Mr. President, I always look upon the best mechanic as the cheapest man; that is, as a foreman of the shop.

I have had a chance to hire a great many men that would come right up to you and say, "I'm a pretty good molder; I can do most anything." Those men I have found a great many times detrimental to the shop. When the day's work came out they were dear men. So that I say to-day I practically coincide with Mr. West and Mr. Sadlier in regard to the mechanic. The good molder to-day is very scarce and we do need to educate molders.

Mr. Lanigan.—Mr. President, as far as I am individually concerned, I make a statement about the locality where I live, with which I am acquainted. My friend, Mr. West, says the molder has degenerated, if I understood him right. Now, in the locality where I lived when I was a boy a man that could mold a railroad frog we considered a first-class workman. What would he be considered to-day? He would not be considered anything more than a helper for the first-class workman of the present time. Who makes those great heavy castings in the shop where my friend here has charge—the Worthington Pump Works? Now, isn't that so, Mr. West?

Mr. West.—You are right.

Mr. Sadlier.—I certainly appreciate what Mr. Groves said, Mr. President, in connection with my paper a few minutes ago, but there are probably a great many other foundrymen throughout America who have been benefited by a number of apprentices that have left the shop where I have had foremanship and also where I have been working as a journeyman, because I have taken pains usually to do all I could to post them in that direction. The only thing that I do not really like about it is that firm or manufacturing company, running a foundry, who will not take interest enough in producing their own mechanics, and getting their own apprentices up to a degree of proficiency only that will come in line with their own work, and then goes into other shops where such pains are taken, and take a man from there. It looks to me a little bit like stealing. I may be wrong but that is the point I had hoped to bring before this convention, that there could probably be some universal agreement, manly understanding, that we would avoid such a condition of things. Mr. Groves has said that some of my boys are working in Pittsburgh, at the Westinghouse Works, I believe. That is true, and they are in many other shops, and I think they are a

credit to the shops that they go to. I do not think I have turned out any that have not been a credit to me. I do not like to do any more of this work than my share, I am willing to do my share of it, but I would like to see the other fellows get in line and help out also.

Mr. Groves.—Mr. President, without continuing this discussion much further as I have my innings Thursday morning, when I shall have to take an eight-thousand horse-power engine and show the convention how every casting is made, from the bed-plate weighing 42 tons, the housing weighing 19, the cylinders weighing as high as 22 and the cylinder heads, and show the whole evolution of what I think I may, without vanity, say is the highest type of molding that is going on in the United States to-day. That will be my work Thursday morning. I just mention it by the way and claim we are doing this kind of work to-day with the class of molders that Mr. Sadlier is speaking of, work that could not be done if we had not men who were raised under the very conditions that he is pleading for. With regard to our own concern, I am proud, without doing this in the way of advertisement, in frankness to say that we have a superintendent who is one of the most competent men in the world in our foundry. He does not appear very prominent in the world to-day, but he is the most able man that I am acquainted with in the art of the foundryman. He took upon himself lately to write out a little primer of chemistry, as he calls it, for the information of the foreman, in a simple way, and we find it very profitable. I have a knowledge of chemistry myself; I haven't any sympathy with those, however, who are pleading for making the foundry foreman a chemist. Even with his knowledge of chemistry he would not have all to do in analysis, but his knowledge of chemistry would enable him to select, by analysis, for certain kinds of castings the kinds of material he wants in the mixture. He can do this readily without being a profound analytical chemist, and there are good foundrymen to-day who do so regularly. I have been a teacher of mechanical engineering for six years and it has been my effort to teach the science of metallurgy to a number of our own foremen who have gone down to the class for years. We give every year a lecture on iron from the mine itself to the finished article. I have something to say about that on Thursday morning, and I have only

to affirm to-day that it is a burning shame that manufacturers to-day should take our boys into the foundries and put them on one class of work and keep them there for three years without doing anything further, and then for men to-day to come around —I am not speaking of my friend Mr. West in this particular— and complain about not having good molders when they do not take the right steps to make the molders. Make the men and we will have no reason to complain.

Mr. Walker.—Mr. President, from the tenor of the remarks we have listened to in the last half hour, I am little afraid we are drifting into the wrong direction. We are not proving that the molder has degenerated, but we are beginning to prove that the foundryman has done so.

President Jones.—Gentlemen, I think that just such discussions as the one that has been going on in the last half hour is what will bring our Association to the front more rapidly perhaps than any other one thing that can be done. Referring to Mr. Sadlier's remarks, if I may be permitted to say a few words, I think that they are highly appropriate. I think that the molder of to-day is degenerating, but on the other hand, it is very largely, if not wholly, the fault of the employer. Foundrymen, the proprietors of foundries, are not philanthropists. I only know of one foundry to-day which apparently is educating its apprentices for the good of their fellow-men. I won't mention any names, but I will say that the foreman of that foundry was in this room this afternoon. They have the best apprenticeship system of anything that it has been my lot to see so far. They take a certain line of apprentices and they graduate them right straight through, and when they get through, if the boy does not come out a molder it is because he has not sufficient talent to learn the trade. If he does not come out a molder it is a foregone conclusion that he never will be one; it isn't in him. Now, the curious feature of those people is this: that when the boy finishes his apprenticeship they will say to him, "Now, John, we do not want to discharge you, but we would prefer that you would quit; you have had the experience of this shop; you have had all the learning here that it is possible perhaps to give you during the four years of your apprenticeship; the reason that we want you to go is that we want you to go out and go into other shops and learn other systems and methods of making

castings, other than what we do here; then we want you to return to us again and there will be a place open for you." Now then, to get back; one of the principal reasons that we do not make better mechanics is because we have not in this country a proper apprentice system. There is not any question about that. I have heard the question discussed and I have read articles about it in a great many different periodicals. The great difficulty is here: we take a boy into our works and we educate him along certain lines, if we propose to make a general molder of him, and when he reaches that period of time in which he becomes of some value to the employer, the other fellow, on the outside, says, "John, what are you getting?" "A dollar a day." "Only a dollar a day? You're worth more than that. I'll give you a dollar and a quarter." Our apprenticeship system is not such that we can hold him and he goes out into the other shop. There isn't the incentive that there should be to make mechanics. Now, that is one feature. There is certainly not the incentive to-day to make what we would call a full-fledged journeyman mechanic, because we are not making that class of people, the demand is not for them. Do not misunderstand me. I do not mean for a moment to insinuate that there is not always an opening for a good molder, but we, as manufacturers of to-day, are surpassing the world in the manufacture of goods from our foundry and other classes of work, not because we are producing them with the best mechanics in the world, but with the best specialists in the world. We take a man or a boy into our works and we educate him on one line of trade. He knows that and he doesn't know anything else. Consequently he is a success, for, if we do not meet success with the specialist, where are we going to look for it? I think these two points are the points that should be considered in discussions of this kind.

Mr. Bell.—Mr. President, I do not wish to take up much time of this Association, because it is getting late. There are several conditions that confront the manufacturers at the present time, that influence very largely the character of men that are called mechanics. In the foundry business we have largely introduced the molding machine. If there is anything that will detract from making a man a general molder, it is a molding machine. He becomes a machine himself. There are other classes of work in all foundries, particularly in the one with which I am con-

nected; we could not afford to do that work made by first-class mechanics, that is out of the question. Now, we take in boys that can in a short time learn to do this class of work and do it well. Well, if he has any ambition, if he has any disposition to become a molder, we give him every opportunity, but if he fails he is still a good hand on that class of work and he is kept there. Now, the best lot of castings that I have seen turned out in Chicago I think was in the McCormick Works, but I didn't see the others. They have no molders scarcely at all. Now, there is a factory where, I suppose, they have nearly five hundred men making castings. I do not suppose there are a dozen molders in the shop, and they are making good castings because they are doing it with machines and the men become machines, specialists, and that is what it all amounts to. Now, we are all indebted to those shops peculiarly situated, such as Brown & Sharpe's and others that I might name, where they do make mechanics, they make a specialty of making mechanics in those shops, and the trade is to-day indebted to them for their efforts in that direction. To say that there are no good molders to-day, or not as good as they were in times past, is stating a thing that is on the surface only. I believe there are better molders to-day than there ever were before in the United States at any period of its existence. I think they make castings that could not have been made 50 years ago by any man that is in the business. I think their advancement is such that they are able to do things that 50 years ago were impossible, and of course it is done by the better class of molders, classes of molders that did not exist in those days. But this other element comes in, the cheap man, the specialist, the boy who cannot advance, the machines, and the conditions make a cloud of molders that are not molders at all, but are only machine men.

Mr. Putnam.—(In "The Tradesman" for June 15th). Mr. Sadlier starts out with the statement that "molding is probably one of the oldest and most ancient of arts." In spite of this many foundrymen are anxiously inquiring as to where the molder of the future is to come from. (After telling one of his characteristic stories the moral of which is, that if you want molders you must make them yourself, Mr. Putnam says:) All of what Mr. Sadlier has said I cordially commend to those who are over-apt to apply severe criticism to the molder. For Mr. Sadlier has

given a very apt presentation of the molder's case. It is a fact that the molder's trade requires as constant application of a high order of intelligence as any trade in the world, and far more so than most trades. In short, the highest success in the foundry demands the highest order of intelligence, combined with honest purpose.

Mr. Sadlier says that the best means of overcoming the difficulties incident to the foundry business is thorough education of the apprentices; "and in doing this we hope, in a measure, to solve the molder problem."

And undoubtedly he is correct. I would add another suggestion, namely, that in the finer branches of the trade the highest intelligence be enlisted. It will cost more, but it is worth more—and he who is not willing to pay what a thing is worth, will have to pay it whether he will or no, before long.

DISCUSSION OF MR. PERCY LONGMUIR'S PAPER ON CONTROL OF THE FOUNDRY.

Mr. E. H. Putnam:—(In "The Tradesmen" of July 1st) Mr. Longmuir takes practically the same position on this question as Mr. West and other practical foundrymen including myself. The foundry foreman, Mr. Longmuir says, should be a molder, not a chemist who is unfamiliar with the details of founding. But he also urges the need of training in metallurgy. And in this he is undoubtedly correct. The fact is that as human society progresses, all men, no matter how high or how low the positions they occupy, should be more highly educated than in the past. Ignorance grows more and more intolerable with each passing year, and, ere long, we shall arrive at a point where no ignorant man will be able to hold a responsible position.

But what is education? The mechanic who has given years to the study of his trade is as certainly educated as the physician or lawyer. But what would have constituted a good medical education forty years ago would not answer at all to-day. The same principle applies to the foundryman; he must keep up with the times, or the times will have little use for him. And there is nothing at all difficult about keeping up with the march of progress in founding. There is nothing hidden; every new discovery, every step in advance is published to the whole world; and the foundryman who locks himself up within the circle of his early education, to the exclusion of the later ex-

perience of progressive men will have only himself to blame if he be found wanting.

There is not nearly so much reason for just complaint against the foundry foreman as one might be led to suppose by reading what is published concerning him.

The ignorance that must account for much of the complaint lies with men who, knowing scarcely anything about the business, wrongfully ascribe ignorance to the foreman.

The operator who knows nothing about the business, and who knows that he knows nothing about it, is a pretty hard man to work for, because he never knows whether his foreman is doing as well as he ought to, and he naturally suspects that he is not; but the worst man of all to work for is he who really has some little practical knowledge of founding, and who imagines that he knows it all. He is like the young man just out of his apprenticeship, who imagines himself to be master of his trade because he has served his time, and whose hig opinion of his accomplishments will not need to be further expanded in order to cover his real powers ten years hence.

Of course there are a great many incompetent men rattling around in the capacity of foundry foremen. But it is certain also that there are many competent foremen who are not achieving nearly as good results as they would if their employers would do their part, in the business. When the proprietor permits the pig iron dealer to dump a few thousand dollars worth of iron in his yard, it makes him feel cross to have the foreman complain that it is not right for his use. But, while the casting product attests the justice of the foreman's complaint, still, the employer himself not a practical foundryman, imagines that probably the difficulty arises from some defect in the foreman's system of manipulation.

They used to tell us that the measure of general confidence in the industrial and commercial prospect effectively modified the degree of prosperity—and they told us true. Confidence is not the sole thing needed in order to insure business prosperity, but it is certainly one of the absolute necessities thereto. And it may be, with equal propriety, said that the measure of a foundry foreman's success is greatly influenced by the degree of confidence that his employer has in him. This applies with tenfold force where the employer is not a practical foundryman.

And it might be that in such a case, a chemist, or for that matter a carpenter, or a dancing master would do as good service as foreman of the foundry as a capable man would. If the employer have not confidence in the ability of his capable foreman, and so will not enable him to do the things that ought to be done, the product will be, in great part, a reflex of the general ability of the workmen employed in the foundry; and in order to get an equal result the dancing master would have merely to look wise and keep his mouth shut.

It will be found that employers who are themselves molders are usually able to get a satisfactory product, both as to quality and quantity, while the great majority of those who are cocksure that all the workmen are time-killers, and that the foreman is incompetent are men who do not know what they ought to expect, and therefore cannot be satisfied with the utmost that can be done for them.

When I reflect upon the impositions that are often practiced upon foundry foremen, not through any intention of doing them wrong, but through the ignorance of their employers, it is little wonder that they resent the proposition to place a chemist, or anybody else but a practical foundryman in the shop to divide authority with them. They know that the partner, being as a matter of course, unfit for the position, must lean upon them, and must extract from them whatever of success may attend the arrangement.

What then—shall we go forward, employing ignorant men as foremen? Not unless we wish to. It is no more necessary to employ ignorant men as foundry foremen than it is to employ ignorant lawyers; it is a simple question of price in both cases. First rate lawyers do not come very cheap—and it takes no more brains to make a first rate lawyer than it does to make a first rate foundryman. Likewise, to become a first rate lawyer requires that the subject study law until he is thoroughly familiar with it, and I am much of the opinion that the same rule applies to the foundryman.